THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XVII. No. 412—20th YEAR.] LONDON, AUGUST 4, 1868. [Subscription per Ann. 15s. in Advance 18s. Credit.] DOUBLE No. Price 1s.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis by Dr. FYFE, M.D.:—
9746 cubic feet of gas per ton of coal.
26-candle gas.
13¼ cwt. coke per ton of coal.
N.B.—Ramsay's Cannel most resembles the Marquis of Lothian's Cannel, but superior as to coke.
RAMSAY'S PATENT CONDENSED COKE,
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828.
FIRE-BRICK WORKS, established 1804.
FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire Clay.
The Fire Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article.
The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the works are the most extensive in the Kingdom.
Manufactories: DERWENTHAUGH, SWALWELL, and HEBBURN QUAY. Offices: BROAD CHARE, NEWCASTLE-UPON-TYNE. Address, G. H. RAMSAY.

GEORGE GLOVER & CO.,
Patentees of the Standard Gasometers for the Government, and of the
IMPROVED DRY GAS-METERS.
These Meters are warranted to measure correctly and not to vary, and have come into general use more rapidly than any Meters hitherto manufactured.
1862.
CLASSES X. AND XXXI.
CLASS X.—"*For ingenuity, completeness, and efficiency of apparatus used in measuring gas, and for excellence of material and workmanship.*"
CLASS XXXI.—"*For superiority of construction and workmanship.*"
Particulars and lists of prices forwarded on application to Ranelagh Works, Ranelagh Road, Pimlico, LONDON, S.W.; 15, Market Street, MANCHESTER; or 127, Boulevard de Magenta, PARIS.

IMPROVED GASLIGHT.
Ample experience has proved that, by carburetting common gas, its illuminating power may be doubled or even tripled, and its consumpt greatly lessened. Wax candles and oil lamps in consequence are being rapidly superseded, and gas is now used in many private houses and mansions where formerly it was not tolerated.
Information as to the apparatus, fluids, &c., may be had of GEO. GLOVER and Co., or CARLESS, BLAGDEN, and Co., HACKNEY WICK, N.E.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS RETORTS and OTHER OBJECTS in FIRE-CLAY," and they have also been awarded in the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

FIRST PRIZE IN THE PARIS EXHIBITION.

JOHN RUSSELL AND CO.,
THE OLD TUBE WORKS,
CHURCH HILL, WEDNESBURY;
ALMA WORKS,
WALSALL, STAFFORDSHIRE;
and 69, UPPER THAMES STREET, LONDON,
Original Manufacturers of Wrought-Iron Gas Tubes and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest Orders may be executed in a few days.
Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanised Tubes, &c.
N.B. All Goods thoroughly Tested before sent out, and Warranted.

JOHN BENT & SON,
WET AND DRY GAS-METER AND STREET-LAMP MANUFACTURERS,
BELL BARN ROAD, BIRMINGHAM.
ESTABLISHED 1830.
All materials found for the alteration of Public Lamps for lighting with the Rod. Regulators with Lava Burners.

BLAYDON BURN AND LOW BENWELL FIRE CLAY RETORT AND FIRE-BRICK WORKS, NEAR NEWCASTLE-ON-TYNE.
WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the Manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other Articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.
London Agents: JAMES LAWRIE & CO., 63, OLD BROAD STREET, CITY, LONDON.

THE "LOTHIAN" CANNEL COALS.
These Cannels are extensively used in the Gas-Works of Edinburgh, where the illuminating power of the gas is the highest in Britain.
The yield per ton is 12,573 cubic feet; illuminating power 33·8 standard candles; coke per ton 1045 lbs.
Ports of Shipment, in the Firth of Forth.

AYRSHIRE CANNEL COALS.
These Cannels are used in Glasgow, Greenock, Paisley, and other Gas-Works on the West Coast of Scotland.
The yield per ton is 10,650 cubic feet; illuminating power 24 standard candles; coke per ton 1216 lbs.
Ports of Shipment, in the Firth of Clyde.
For prices and other information, apply to Mr. JOHN ROMANS, C.E., 53, Frederick Street, EDINBURGH.

NOTICE.
LESMAHAGO GAS OR CANNEL COAL.
JAMES FERGUSON & CO., Auchinheath COLLIERY, LESMAHAGO, and the NITSHILL & LESMAHAGO COAL COMPANY, AUCHINHEATH AND SOUTHFIELD COLLIERIES, LESMAHAGO, sole Proprietors and Producers of the above celebrated GAS COAL, beg to intimate to Gas Companies and other consumers that, having reason to suspect that Cannel or other Coal of very inferior quality, both as regards the quantity and illuminating power of the Gas, has frequently been mixed with and sold under the name of "Lesmahago," they have now appointed Messrs. JAMES LAWRIE & Co., of 63, Old Broad Street, LONDON, E.C., sole agents for England; and Messrs. LA COUR & WATSON, of LEITH, sole agents for foreign markets; and, in order to prevent a recurrence of the frauds named, they request that all purchasers will send their orders through the above-named firms. Orders for other than the above-named markets may be forwarded direct to either of the Proprietors.
The Proprietors will, in future, use their own forms of bills of lading, and also issue certificates of origin, signed, as the case may be, either by JAMES FERGUSON & Co., or by the NITSHILL & LESMAHAGO COAL COMPANY; and they request all consumers purchasing Lesmahago Coal to demand such a certificate for each cargo, and to observe that it corresponds with the bill of lading.
Auchinheath, Lesmahago, March, 1868.

MEDAL AWARDED, EXHIBITION, 1862, "FOR GOOD WORK."
THE IMPERIAL TUBE COMPANY, BIRMINGHAM,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS, BRASS & COPPER TUBES,
GALVANIZED & GLASS ENAMELLED TUBES & FITTINGS,
LAP-WELDED IRON & BRASS BOILER-TUBES, ETC., ETC.
☞ Sole Makers of "HUGHES'S PATENT TAPS," Strongly recommended for all High-pressure purposes.—Price List and Testimonials forwarded on application.

THE UNVARYING WATER-LINE GAS-METER.
(SANDERS & DONOVAN'S PATENT.)
"Unquestionably the best Water Gas-Meter now in use."
MANUFACTURERS:
THE GAS-METER COMPANY, KINGSLAND ROAD, LONDON;
WITH
Branch Manufactories at DUBLIN and OLDHAM.

JOURNAL OF GAS LIGHTING NEWSPAPER

GAS AND WATER PIPES.

CLARIDGE, NORTH, & CO.,

BILSTON.

TO CORPORATIONS, GAS ENGINEERS, AND OTHERS.

HENRY ALDER,

GRANGE METER-WORKS, EDINBURGH,

Begs to intimate that he is the ORIGINAL MANUFACTURER of

DRY GAS-METERS IN CAST-IRON CASES.

The Meters are protected by Registration on the 17th of December, 1864, under the "Copyright of Designs Act."

They are much more durable, and at the same time more easily repaired than those in Tin Cases.

PRICE LIST AND TERMS ON APPLICATION.

Agent for Ireland—Mr. J. FURNESS, 3, Fownes Street, DUBLIN.

BEST AND HOLDEN'S

PATENTS FOR CHARGING AND DRAWING GAS-RETORTS,

WITH CHAMBERS FOR MOUTHS,

REQUIRING NO LUTING.

Gas Engineers are solicited to examine into the merits of this invention before erecting new or altering old retort-houses. It may be seen in action at the Alliance Gas Company's Works, Dublin, where its utility and economy will be clearly demonstrated. Although the saving in labour will be considerable, and quickly return any outlay of capital, there are other and important features strongly recommending its adoption at all gas-works, and which a gas engineer upon examination will at once appreciate.

The Directors of the Alliance Gas Company have kindly consented to give every facility to gentlemen desirous of seeing the invention in operation. Parties, therefore, about to visit Dublin will be so good as to send us their card, and we will furnish them with letters of introduction.

Drawings, &c., may be seen at our Office, and all details explained.

JOHN CHISHOLM, SON, & CO., 44, MARK LANE, E.C.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS.

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and SALT-GLAZED DRAIN-PIPES.

LONDON AGENT:

MARCUS BOURNE NEWTON,

Wharf No. 4, inside Great Northern Goods Station, King's Cross,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

N. DEFRIES,

INVENTOR OF THE FIRST SUCCESSFUL

DRY GAS-METER.

210,000 IN USE.

WORKS:

DIANA PLACE, EUSTON ROAD, LONDON.

D. GRANT & CO.,

GAS-METER MANUFACTURERS.

STATION-METERS ANY SIZE.

PHOTOMETERS, EXPERIMENTAL METERS,

PRESSURE-GAUGES, &c.

Price List on application.

GAS-METER WORKS, CROSSCAUSEWAY, EDINBURGH.

INTERNATIONAL EXHIBITION,

1862. CLASS X.

PRIZE MEDAL

For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,

THROCKLEY,

NEWCASTLE-ON-TYNE.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c. &c.

SCOTSWOOD FIRE-BRICK WORKS, NEAR BLAYDON-ON-TYNE.

JAMES NEWTON & SONS,

(Established 1820,)

FIRE-BRICK AND TILE MERCHANTS,

Wholesale and for Exportation,

FALCON DOCK, 78 AND 79, BANKSIDE, SOUTHWARK, LONDON, S.E.,

DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

WOOD SIEVES for GAS PURIFIERS.

THE BEST AND CHEAPEST

CAN BE PURCHASED FROM

T. COULTHARD, WEST STRAND, PRESTON, LANCASHIRE.

HANCOCK'S INDIA-RUBBER GAS-TUBING.

All sizes, from ¼ in. to 4 in. diameter and upwards.

Also,

HORSE SINGEING APPARATUS, best make, with GAS-BURNERS, COMBS, and INDIA-RUBBER TUBING, all complete.

INDIA-RUBBER BAGS for GAS-MAINS.

WASHERS for GAS and STEAM JOINTS.

VALVES (pure solid Rubber) for STEAM-ENGINES.

PACKING (Elastic) for STEAM-ENGINES.

FLANGE TUBING, for excluding Draughts and Dust through WINDOWS, DOORS, and GLASS CASES.

Section.

Illustrated Price Lists on application.

JAMES LYNE HANCOCK,

Vulcanized India-Rubber Works,

GOSWELL MEWS, AND 266, GOSWELL ROAD LONDON, E.C.

Established 1811.

READY & SON,

BILSTON STREET BRASS FOUNDRY,

WOLVERHAMPTON,

MANUFACTURERS OF

SUN BURNERS, GAS CHANDELIERS,

ALL LANTERNS, BRACKETS, PENDANTS,

And every Description of

GAS-FITTINGS,

Including

MEDIÆVAL FITTINGS for CHURCHES, &c.

Large Pattern Books complete, with Book of Prices, 7s. 6d.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the advertiser, 42, Parliament street, WESTMINSTER. [Office of the JOURNAL OF GAS LIGHTING, &c.]

Trade Mark. **THE MEDAL FOR 1862.**

THE ONLY PRIZE MEDAL AWARDED FOR TUBES AND FITTINGS.

CROWN TUBE-WORKS,

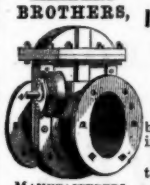
WEDNESBURY STAFFORDSHIRE.

WAREHOUSE—81, UPPER GROUND ST., LONDON.

JAMES RUSSELL & SONS,

Patentees and First Makers of Wrought-Iron Tubes.

LAMBERT BROTHERS,



MANUFACTURERS, WALSALL.

REDUCED PRICES OF

IMPROVED GAS-VALVES

WITH WROUGHT-IRON PINIONS.

2, 2½, and 3 in.... 12s. per in.
4 in. to 6 in..... 11s. „
7 in. to 12 in..... 10s. „

These Valves are all proved on both sides to 30 lb. on the square inch before leaving the works.

Valves made with outside racks to order.

Also Water-Valves, with gun-metal faces and gun-metal screws.

TO GAS COMPANIES AND THE TRADE.

J. DEFRIES & SONS,

MANUFACTURERS OF

CRYSTAL, BRONZED, & ORMOLU CHANDELIERS;

IMPROVED CRYSTAL STAR & SUN LIGHTS;

VESTIBULES,

RON BARREL, COMPOSITION TUBING,

AND

GAS-FITTINGS OF EVERY DESCRIPTION.

WORKS:

LONDON, BIRMINGHAM, AND PARIS.

REGISTERED CRYSTAL CHANDELIER.

Special Designs prepared in perfect accordance with architectural arrangements. Estimates furnished for the Lighting and Fitting up of Theatres, Music-Halls, and Public or Private Buildings with Gas.

GAS MOONS OF THE NEWEST DESIGNS.

The Patent Gas-Regulator & Purifier reduced to 6s. 6d. per Dozen.

Pattern Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1868, are now complete.

CITY SHOW-ROOMS & MANUFACTORY,

147, HOUNDSDITCH.

THOMAS EDINGTON & SONS,

PHŒNIX IRON-WORKS,

GLASGOW,

Manufacturers of all kinds of

GAS AND WATER PIPES,

Branches, Bends, Water-Traps, Tank-Plates, Valves, and general Castings. Also

RAILWAY CHAIRS & SLEEPERS,

AND

GRIFFIN'S PATENT PERMANENT WAY.

London Office, 63, Old Broad Street.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, Ghent.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications, addressed to J. SUGG and Co., GHENT, will receive immediate attention.

W. J. HOLLANDS,

IRON MERCHANT,

31, BANKSIDE, LONDON, S.E.

SOCKET, FLANGE, HOT-WATER PIPES, AND ALL CONNEXIONS; RETORTS, HYDRAULIC MAIN, LAMP-COLUMNS, &c.; AND EVERY DESCRIPTION OF CASTINGS AND WROUGHT-IRON-WORK FOR GAS AND WATER-WORKS, STEAM, AND GENERAL PURPOSES.

N.B.—All goods kept in stock, and supplied at wholesale prices. Estimates given, and orders by post punctually attended to the same day.

JAMES OAKES and CO.,

ALFRETON IRON WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 20, WHARF ROAD, CITY ROAD, LONDON,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water-Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.

CHARLES HORSLEY, Agent.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET,

EDINBURGH.

Established 1840.

WALTER MABON & CO.,

Engineers,

ARDWICK IRON-WORKS,

FAIRFIELD STREET, MANCHESTER,

MANUFACTURERS OF

IRON TANKS, GASHOLDERS,

GAS APPARATUS,

PIPES, VALVES, IRON ROOFS,

WROUGHT AND CAST-IRON GIRDER

DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

FIRE-CLAY GAS-RETORTS, &c., CANNEL AND STEAM COALS.

WILLIAM FRASER, Inverkeithing (owner of the Works at which Fire-clay Retorts were first made), having greatly enlarged his works, can supply retorts and other fire-clay goods to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

WILLIAM FRASER ships COWDENBEATH PARROT COALS at Charlestown and Burntisland at 12s. per ton; and HALBEATH STEAM COALS, on Navy List, at 8s. 6d. per ton.

D. BRUCE PEEBLES,

Gas-Meter Manufacturer,

FOUNTAINBRIDGE

EDINBURGH.

STEARS BROTHERS & CO.,

Gas Engineers and Contractors,

16, PARLIAMENT STREET, HULL,

AND

11, COLEMAN STREET, LONDON, E.C.

Contractors for Gas-Works of any size at home or abroad. Copy of testimonials from numerous Gas Companies can be had on application.

J. T. B. PORTER & CO.,

GAS ENGINEERS,

MANUFACTURERS AND CONTRACTORS FOR GAS-WORKS

Of any extent at Home and Abroad,

GOWTS BRIDGE WORKS, LINCOLN,

AND

JOHN STREET, ADELPHI, LONDON, W.C.

ALFRED PENNY, Gas and

CONSULTING ENGINEER,

WENLOCK IRON WORKS,

21, WHARF ROAD, CITY ROAD, LONDON.

Mr. PENNY having had a large experience in the construction, alteration, and management of Gas-Works, begs to inform the Directors of Gas Companies that he may be consulted on all matters appertaining thereto. He also manufactures Gasholders, Purifiers, and all the various apparatus used in Gas-Works, and keeps in stock Retorts and Mouthpieces, Socket-Pipes, Bends, Branches, T-pieces, &c. &c.

Plans, Specifications, and Estimates prepared.

ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of Clay Retorts, Fire-Bricks, and every Description of Fire-Clay Goods.

THE

UNIVERSAL EXHIBITION OF PARIS,

1867.

SILVER MEDAL.

THOMAS CLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

CLERKENWELL GREEN, LONDON,

HAVE BEEN AWARDED THE HIGHEST PRIZE FOR

DRY GAS-METERS,

BY THE IMPERIAL COMMISSIONERS FOR THE

UNIVERSAL EXHIBITION, 1867.

WILLIAM PARKINSON AND CO.

(SUCCESSORS TO SAMUEL CROSLEY),

PATENT WET AND DRY GAS-METER MANUFACTURERS, &c.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

PATENT IMPROVED WET METER.

W. P. and Co. invite especial attention to this Meter, which entirely overcomes the difficulty to which ordinary Wet Meters are subjected, owing to the short range of the Float, which is necessary, in order to meet the requirements of the Sale of Gas Act.

"It is well known that n Meters constructed so that the valve will close when the water is drawn off to such a point as to render them 3 per cent. slow the lights are liable to be extinguished by the closing of the valve by a sudden increase of pressure. To meet this difficulty, Mr. Pinchbeck has invented an ingenious and simple arrangement by which the action is reversed, and any such increase of pressure, in his Meter, raises the value instead of depressing it. The fact of the improvement having been adopted by Messrs. W. Parkinson and Co. is a sufficient guarantee that it practically and effectually remedies the inconvenience it is designed to meet."—JOURNAL OF GAS LIGHTING.

PATENT IMPROVED DRY METER,

Which W. P. and Co. pledge themselves to manufacture with the same quality of materials and workmanship as in their Wet Meter, thereby giving Gas Companies and others the advantage of procuring a first-rate Dry as well as a Wet Meter, which, hitherto, they have been unable to do.

STATION-METERS AND GOVERNORS.

Which can be seen at all the London Gas-Works. Also Liverpool, Manchester, Sheffield, Nottingham, Belfast, Glasgow, Birmingham, Dublin, Bristol, Leeds, Leicester, Brighton, Southampton, Sunderland, Wolverhampton, Bradford, Norwich, &c., &c.

TEST GASHOLDERS, EXPERIMENTAL METERS, EXHAUSTER REGULATORS,

MINUTE CLOCKS, PRESSURE GAUGES, PHOTOMETERS, PRESSURE REGISTERS, &c.

CONTENTS.

Notes upon Passing Events:— PAGE
The Electric Telegraphs Act . . . 577
Lord Redesdale and the South-Eastern Railway Bill . . . 579
Withdrawal of Mr. Oppenheim's Offer to the Common Council . . 579
Mr. Robert Rawlinson and his *Protégé* . . . 579
Circular to Gas Companies:—
Proposed Purchase of the London Gas-Works by the Metropolitan Board of Works . . . 579
The *Saturday Review* on Mr. Cardwell's Committee . . . 580
Report of the Corporation Gas Committee to the Common Council . 580
Mr. Hughes's Report on the Sanitary State of the Independent Gas-Works . . . 580
Proposed Raising of £300,000 on Debentures by the Chartered Gas Company . . . 581
Issue of the Injunction against the Cambridge Gas Consumers Company, Limited . . . 581
The Metropolitan Gas Accounts for 1867 . . . 581
Correspondence:—
Mr. Rawlinson and his *Protégé* . . . 581
Public Lighting at Reading . . . 581
Register of New Patents:—
Baird, A. F.—Improved Earth-Closet . . . 581
Clark, A. M.—Raising Water, &c. . . . 581
Sault, T.—Slide-Valves . . . 581
Norton and Hawksley—Burning Combustible Liquids, &c. . . . 581
Varley, J.—Raising, Supplying, and Measuring Water . . . 581
Berry, W.—Removing Mud, Drift, &c. . . . 582
Thurgar, W. C.—Regulating the Supply of Gas to Burners . . . 582
Hicks, J. J.—Lighting Gas and other Jets and Lamps . . . 582
Hubner, E.—Rotary Steam or Gas Engine . . . 582
Stevens, B. F.—Illuminating Roof and Roof Pavement . . . 582
Brooman, C. E.—Producing Hydrogen . . . 582
Tolhausen, F.—Disinfecting Fœcal and Manuring Matters . . . 582
Rae, J.—Cleansing and Filtering Water . . . 582
Bell, T.—Treating Oxide of Iron Residues . . . 582
Clark, A. M.—Valve Closet Apparatus . . . 582
Watson, R.—Distributing Gas for Heating and Lighting . . . 582
Potts, W.—Ventilating Rooms and Buildings . . . 583
Lenzberg, L.—Gas-Lamps and Burners . . . 583
Mackenzie and Robinson—Apparatus for Preventing Waste of Water. 583
Aitchison and Grantham—Production of Carburetted Gas . . . 583
Ritchie, C.—Regulating the Supply of Gas, Air, and Water . . . 583
Cooke, W.—Regulation of Up and Down Currents of Air . . . 583
Forbes, H.—Rotary Pumps . . . 583
Batcheldor, G.—Trough Water-Closets . . . 583
Williams, T. H.—Improvement of Gas-Burners . . . 584
Abel, C. D.—Converting the Gaseous Products of Combustion into Combustible Gases . . . 584
Marbeck and Clayton—Water-Meters . . . 584
Woodcock, W.—Warming and Ventilating Buildings . . . 584
Wilkinson, G.—Pumps . . . 584
Brunton, J.—Machinery for Raising Water . . . 584
Weston, T.—Ornamental Metallic Tubes . . . 584
Ritchie, C.—Mechanism applicable to Steam-Boilers and Furnaces . 584
Jeffery, F. J.—Urinals . . . 584
Williams, L.—Combined Lift and Force-Pump . . . 584
Taylor, N. F.—Impregnating Air and Aëriform Fluids or Gases with Hydrocarbons . . . 584
Garrett, R.—Ball and other Cocks . . . 585
Potts, W.—Gaseliers . . . 585
Brotherton and Waldron—Lamp-Posts . . . 585
George, R.—Warming and Ventilating . . . 585
Withinshaw and Baker—Actuating Slide-Valves . . . 585
Brönner, J.—Gas-Burners . . . 585
Baré and Thomson—Transmission of Fluids . . . 585
Applications for Letters Patent . . . 585
Grants of Provisional Protection . . . 586
Notices to Proceed . . . 586
Patents which have become Void . . . 586
Parliamentary Intelligence:—
House of Commons Committee—Windsor and Eton Water-Works Bill. 586
Legal Intelligence:—
Rolls Court—The Gaslight and Coke Company *v.* the Great Central Gas Consumers Company . . . 593
Vice-Chancellor's Court—The Attorney-General *v.* the Cambridge Gas Consumers Company, Limited . . . 593
Halifax Borough Court—The Corporation of Halifax *v.* Firth . . . 593
Miscellaneous News:—
Metropolis Gas Supply—
Report to the Court of Common Council from the Special Gas Committee . . . 594
Metropolitan Board of Works . . . 595
Return by the Metropolitan Association of Medical Officers of Health of the Average Composition and Quality of the Metropolitan Waters in July, 1868 . . . 595
Dr. Frankland's Analysis of the Metropolitan Waters in July, 1868 . 595
Alarming Occurrence at the Chartered Gas-Works . . . 595
Strike at the Philadelphia Gas-Works . . . 595
Share List of Metropolitan Gas Companies . . . 596

NOTICES.

The subscription to the JOURNAL is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders should be made payable at the Money-Order Office, London, to William B. King, 11, Bolt Court, Fleet Street, by whom the business department of the JOURNAL is conducted.

The next number will be published on Tuesday, August 18, and the subsequent numbers on each successive alternate Tuesday.

All communications for the Editor to be addressed, "No. 42, Parliament Street, Westminster;" and all remittances for subscriptions or orders for advertisements to the Publisher, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 4, 1868.

Notes upon Passing Events.

THE Electric Telegraphs Bill is the most important measure, in a social and commercial sense, that has become law during this Parliament. We have had nothing of equal importance since the introduction of the penny post. The principle of the Bill is that telegraphic communication shall be extended to a large number of districts that will not pay. On the same principle that there is a loss on every letter sent to Ireland and to some of the more remote villages of England and Scotland, telegraphic intelligence will no longer be required to pay a dividend; so long as the total transactions of the year pay the expenses and the interest on the purchase-money the nation will be satisfied. This is the sound part of the official scheme, for no joint-stock company promoter could be more out in his financial calculations than the energetic Mr. Frank Ives Scudamore, the real author of the transfers of telegraphic business from private companies to Government. He began with a capital of three millions, he has already advanced to six, and we may reasonably conclude that before the whole job is finished it will cost eight millions. The tax-paying public will not grumble at this inevitable extension of capital if there be ever so small a surplus after paying interest and working expenses, and if the work be as well and cheaply done as Mr. Scudamore promises. The theory in favour of a transfer to Government of the management of electric news was so unanswerable that no one in the select committee attempted to contest it seriously. The two active opponents of the Bill were Mr. Leeman and Mr. Göschen. Mr. Leeman represented, with extraordinary acuteness and tenacity, the interests of the telegraphic companies; and although he, with great ingenuity, gave a national or patriotic flavour to some of his questions, he really only fought, and fought most successfully, for an ample price and an ample compensation. He established a valuable precedent for any future case in which the Government may undertake a compulsory purchase from private companies. The line taken by Mr. Göschen, however meant, had only the effect of making a better price for the companies; and therefore, while he talked in the phrases of an economical reformer, he unwittingly sweetened the sale. Thus it happens that those who esteem economy in public expenditure owe no thanks to Mr. Göschen, for this opposition gave the companies at least four years additional purchase for their shares. In the committee there was really no common-sense answer to the Post-Office case. The Post-Office said: "We propose to extend the use "of the telegraph to every money-order office in the United "Kingdom. At present, in hundreds of instances, a railway "telegraph wire passes within half a mile, or at most a mile, "of the post-office—a connexion can be made at a cost of "about £30 a mile. Then we have everywhere offices with-"out extra rent, the services of post-office keepers and letter "carriers, at trifling extra wages, as our first advantage over "a private company; secondly, we have a virtual monopoly, "which will give us all the best paying business to the best "towns; and, thirdly, we are relieved from the necessity of "paying a dividend on our capital. These advantages will "enable us to reduce the charge for a telegram of twenty "words to one shilling, irrespective of distance, and to pay "the loss on remote rural stations out of the profit of dense "commercial populations." The importance of these extensions may be illustrated by the case of a fishing village, which, although not sending enough telegrams in the year to pay expenses, might derive great profits from being able to telegraph its takes of mackerel or herrings; so, too, a telegraph-office at the post-office will greatly facilitate the working of a recently opened mining district. Men in business going for vacation to the sea-side will often in preference select a very quiet place, if they can have the use of the telegraph. The examples might be multiplied a hundred-fold, but it is not necessary to pursue them.

The example of the Admiralty as a builder and repairer of ships shows abundantly that a government has the greatest difficulty in securing the services of able men, of using them

when engaged, and, above all, of getting rid of incompetent men. The Government buys dearer and sells cheaper than any individual or company, and is always liable to be compelled to deal with commercial matters on political and not on commercial principles. As Irish matters are always managed on exceptional principles, it is probable that the Government will be compelled to buy the Irish railways; and if it goes further and attempts to work them, we shall not only see the appointment of railway clerks and managers made a parliamentary business, but an extension of a branch will become a political job. The more the telegraph transfer to Government is examined, the more its exceptional character will appear. It seems from the evidence that the telegraph business of Belgium is conducted at a small loss, although that loss is less at half a franc than it was at a franc. The French telegraphs are also worked at a loss less the value of official telegrams. But we do not consider the experience of the Continent of much value either for or against the Electric Telegraphs Bill. At present, as a rapid means of communication, the London District Telegraph is less useful than the post, and telegraphs into rural districts are most unsatisfactory, because their delivery is as uncertain as their cost. The evidence, as usual in such investigations, contains a good deal of useful information. As before observed, it is proposed, in the first instance, to open an office for the receipt and despatch of telegrams at every money-order post-office. There are, in England, 2056 towns and villages having money-order offices, of these 850 have no telegraph, 567 have imperfect telegraph accommodation, and 648 have perfect telegraph accommodation. In Scotland, out of 385 places with money-order offices, 196 have no telegraph communication and 92 have imperfect accommodation—that is, by sending a mile or more to a railway station you can send a message if the wire is not engaged for railway business, and you may receive a telegram if the one porter has time to bring it. There are also, beside the money-order offices, 13,000 receptacles for letters, either houses or pillars. It is proposed that telegrams on stamped paper dropped in these boxes shall be delivered by the postman at the nearest telegraph-office. The post-office receives 750 million letters annually; 3 millions are returned, of which three-fourths find their way to the address or to the writer.

The following facts were given as reasons for expecting a great increase in telegraphic business with lower rates and shorter distances to travel to each office:—In 1863, with 15,200 receptacles for letters, there were 640 million letters posted; in 1867, the receptacles being increased to 17,200, the letters had increased to 774 million, or at the rate of 45,000 for each receptacle, being a net increase of 3000 letters. Thus increase of accommodation produced increased letter writing. Again, Post-Office savings banks were established in 1861; the number of depositors in the old savings banks had remained up to that date for many years nearly stationary, but up to 1866 there was an increase of 6½ per cent., although the rate of interest was lower at the Post-Office than under the old system. The old savings banks had 1,600,000 deposits, and 2,400,000 transactions. In 1867 there were 855,000 accounts opened at the post-offices, upon which nearly ten millions were due to depositors; and the number of money-order transactions was nearly 12 millions, as against 2½ million transactions of the old savings banks. The profit on the Money-Order Office is between £30,000 and £40,000 a year—a good reason, by-the-by, for reducing the very heavy charges for transmitting sums under £2. Mr. Scudamore mentions in his evidence that 40 years ago Mr. Whitbread brought a Bill into Parliament, which passed a second reading, to establish money-order offices, Post-Office savings banks, and Post-Office insurance offices, solely for the benefit of the poorer classes; "and when, 28 years ago, the Money-Order "Office was established, it was designed simply for the benefit "of the poor; it was never imagined it would become the "backbone of the retail trade throughout the country. . . "The fish, game, and vegetables that come from distant parts "of the country are almost invariably paid for by money-"orders. For this purpose large sums are remitted to the "Scilly Islands, to the coast of Scotland, and Cornwall." Mr. Scudamore bases his calculation of the increase of telegrams when the number of offices is increased, by his experience at the Post-Office. "Whenever we can shorten the "course of post, so as to lessen the time required for the "transmission of a letter and the reply, so making it possible "for the public to write a greater number of letters and replies "in a given time, we invariably get more letters in that time." "The most remarkable instance took place in 1860, when, by "accelerating the mails, we shortened the course of post be-"tween Paris and Manchester and other towns by one day. "The immediate effect was an increase of from 10 to 15 per "cent. in the number of letters passing between this country "and France." In the same way it constantly happens that when free delivery is extended at the request of the inhabitants to some village where previously the letters were very few, after a short time it is found that the correspondence has so grown as to yield a moderate profit.

One of the most formidable objections raised by Mr. Grimston, in the pamphlet issued by the Electric Telegraph Company, to the transfer of telegraphs to Government, was that newspapers would no longer have the advantage of receiving news collected for them by a department organized for that purpose. This difficulty has been got over by the Post-Office agreeing, for a certain fixed tariff, to place wires at the disposal of a newspaper association, which is to be formed for the express purpose of collecting news. This arrangement is considered a great boon by the provincial newspapers, who seem almost unanimously dissatisfied with the system on which they are at present fed with bits and scraps of home and foreign intelligence. We get an amusing instance of this in the evidence of Mr. Finlay, the proprietor of the *Northern Whig*, published at Belfast. Mr. Finlay complains that he has had to pay for foreign intelligence he did not want from Mr. Reuter, while he was unable to get sporting intelligence he did want. For instance, when Lord Lurgan won the Liverpool Cup, they refused to tell who the winner was. "Now, there are ten thou-"sand people in Belfast who would wish to know that Lord "Lurgan had won the Liverpool Cup for one who would wish "to know of a revolution in Bulgaria." The objection, founded on the example of France, that the Government might pry into the contents of telegrams, can only be answered by reference to the different political constitution of the two countries. In France, in spite of the formal denials of the practice contained in the French minister's letter published in the Blue-Book, there is not the slightest doubt that telegrams are carefully examined as a matter of political policy, and there are strong reasons for believing that the personages connected in a mysterious way with the French Government who have, in a very few years, made colossal fortunes out of nothing, have used the telegraph-office, like many other State secrets, for their own purposes. To speculators of the De Mornay class, like the "*sapeur*," nothing is sacred; but in England the minister suspected of tampering for commercial purposes with the post or telegraph-office would be ruined. A few years ago a gentleman connected with the highest families, a man of good talent and extraordinary personal popularity, on the eve of taking possession of a colonial appointment which would have led him to the governorship of an Indian presidency, was suspected of speculating on the contents of a forthcoming Budget while private secretary to a minister; the result was his total ruin. He never can be heard of again either in Parliament or in office. Sir James Graham, in spite of his remarkable talents as a debater and as an administrator, was never able to get over the suspicion of having had letters opened for the information of the Austrian ambassador. We may rest assured that telegrams in the hands of Government will be as safe as letters.

But, although the Electric Telegraphs Bill has become law, another important Act must be passed before it can come into operation. The capital for carrying into effect the bargains and the work has to be raised, and that will be in the hands of the next Parliament. However, we may take it for granted that no minister will propose to upset a scheme which has become popular in proportion as its practical effects have become known. Mr. Göschen's hint, that he would oppose the bargains made with the telegraph companies, may be taken for so much political "bunkum." Certainly the Post-Office is fortunate in having the services of an officer so able and so energetic as Mr. Scudamore. At the head of a railway company his salary would have been counted in thousands, and he would probably early have occupied the same position as those railway notabilities who have grown from managers into financial authorities and powers. It is very amusing to see, in the Blue-Book of evidence, how the bold and successful diplomacy that made rapid and favourable terms with telegraph companies and their officials turned hostile into favourable witnesses, and left the members of the committee who were

opposed to the Bill without the expected evidence. Mr. Culley, the engineer; Mr. Latimer Clerk, the consulting engineer; and Mr. Weever, the secretary of the Electric Telegraph Company, were all called, and all gave evidence which was incidentally in favour of the Bill. Mr. Weever's evidence, when cross-examined as to the celebrated Grimston pamphlet, was amusing, for it came to this: The statements in the pamphlet as to the undesirability and absurdity of further extending the telegraph system were quite true in a commercial sense; "therefore, though it might be ridiculous to have to "find an office and an official to work an instrument, it might "not be ridiculous if you had an office already existing, and "some one constantly there. Of course we always look to "profits first, and then to public interest . . . I give my "evidence with reference to the company's interests and with "reference to paying a large dividend; that is my business." No telegraphic inquiry would be complete without the appearance of the Peter Peebles of patentees, Mr. Thomas Allan, who has expended all his own means, and all the money which friends, fascinated by his enthusiastic eloquence, would advance, in promoting a series of patents which may be of great value, but unfortunately no telegraphic engineer of any authority will admit their merit; while the United Kingdom Telegraph Company, formed under his auspices, never paid dividend until it dispensed with the services of Mr. Allan, and abandoned his system; nevertheless he appeared before the committee as "intelligent" and as hopeful as ever, with a prospectus for organizing "a "network of electrical communication throughout Great "Britain to convey messages at a low uniform rate—sixpence "for a short message. To effect this the company have "secured Mr. Allan's systems, by the adaptation of which "there will be an estimated economy of from 40 to 50 per "cent. in first cost and working expenses, as compared with "the systems now in use." And this scheme is confidently put forward to the committee, who were, however, informed of the United Kingdom, which was to do such wonderful things with Mr. Allan's patents and a capital of £150,000. Mr. Allan now wants £500,000 to do considerably less. For a specimen of egotistical pertinacity in an unsuccessful patentee we can safely recommend page 114 of the Electric Telegraph Blue-Book.

Lord Redesdale has at length met his match in the House of Lords, and his mania for interference a serious check. Lord Redesdale has so long been the despot—the beneficent despot he sincerely believes—that he can scarcely understand how even a Lord Chancellor dares to question his fiats; still more astonished was he when the new Marquis of Salisbury fell upon him with words as rough and style much more powerful than his own. Lord Redesdale proposed to protect the South-Eastern shareholders from themselves and from bad advisers by refusing to allow them to divide their present shares into preferential and ordinary stock. The arguments that Lord Redesdale used it is not necessary to discuss; they would have been quite in place if he had been a shareholder at a meeting of shareholders, although it would scarcely have been safe for him to venture on personal imputations of dishonesty. Lord Redesdale is quite right in saying that if the South-Eastern stock is divided, the half that is to receive a dividend fluctuating with the receipts will be a much more easy subject for speculation than the whole and much heavier paid-up shares. But admitting that as a fact, is it the business of the Legislature to protect the public against stock jobbery? Certainly, it has not been considered the duty of our Government—which, thank heaven, is not a paternal Government. If it once becomes the business of the Legislature or the Government to prevent the people from investing or managing their property foolishly, where is the interference to end? The Marquis of Salisbury suggested the management of land, and there truly is room for unlimited interference by a Redesdale land reformer. Imagine a Bill brought in to protect landlords from their own folly and ignorance—to compel them to drain their clays; to cut down useless hedgerow timber; to clear away fences that harbour rabbits and partridges nests, and encroach on crops; to make over-preservation of game unlawful; and to give every farmer with £10 an acre capital the right to a nineteen years lease. All this might be defended on the ground that it would increase the landlord's rents, give them a better class of tenants, and be very advantageous to the nation; but how Lord Redesdale, representative of the most conservative landed interest, would storm at such an invasion of the rights of property! The worst point about Lord Redesdale is, that he does not reason; he scolds and imputes motives which, applied to himself, he would resent by bringing the accuser to the bar of the House. Lord Redesdale cannot say anything too bad of the gambling spirit which prevails alike on the turf and on the Stock Exchange; but his attempt to check it by mangling the Bill in which the shareholders of the South-Eastern sought to relieve themselves from their heavy load, was simply spiteful and childish. The shareholders of the South-Eastern find themselves burdened with a stock on which it is difficult to raise money; by dividing it into preferential and ordinary, they will be able to use the preferential stock as security, and take the chances of the traffic on the ordinary; and they will also be able to dispose more advantageously of part without sacrificing the whole. To permanent investors this will be a great relief, and this class is not much affected by Stock Exchange operations. We may be quite sure that as long as there are gamblers there will always be stock found to gamble with; but, in fact, the creation of preferential stock like permanent debentures will enlarge the area of investment as distinguished from mere speculation. Suppose Lord Redesdale turns his attention to the other end of the town, and to the turf swindlers and "welshers" amongst his own order.

The discussion in the Common Council having ended by Mr. Oppenheim withdrawing his offer of a statue of Prince Albert, we have escaped one horror but are threatened with two more. The committee of the Lord Holland Memorial—a committee composed of some of the greatest names in the peerage and the most distinguished in politics and diplomacy—are troubled with a surplus of two thousand pounds, so they have determined to lay it out in a statue to be placed in Holland Park, facing the cab stand. We shall be curious to see what sort of a work of art "all the talents" will obtain for their money. Then, again, Mr. Roebuck—from whom one might have hoped better things, with a lively recollection of Sir Robert Peel chased out of Palace Yard—asks for a statue of Lord Brougham. It is to be hoped that some less offensive monument will be found to recall the memory of a man to whom it was given

"To tame the proud,
The fetter'd slave to free."

Mr. Robert Rawlinson, it would seem from a letter we print, does not approve of our jokes on his pertinacious patronage of his late assistant, Mr. Lawson. Mr. Rawlinson should remember that "those who play at bowls must expect "rubs." The engineering world have not forgotten how he broke up the Purification of Rivers Commission by the tone in which he publicly attacked his fellow-commissioner, Mr. Harrison, at Liverpool. Mr. Harrison having asked some questions which a glib witness could not answer, was branded in the organs which endorse Mr. Rawlinson's doings as "the "advocate of the midden interest." What the Home Office thought of Mr. Rawlinson's exhibition of temper may be judged from the fact that they relieved him from the duties of the commission of which he was chairman. If we rightly understand Mr. Rawlinson's letter, he claims the privilege, in his official capacity, of recommending a favourite engineer. He has certainly exercised this privilege at Banbury, at Bedford, at Tunbridge Wells, at Wimbledon, and many other towns. We need only ask what would be thought and said if the parties applying to the Treasury for loans to execute public works in docks, harbours, lighthouses, &c., always found it advisable to appoint as their engineer some one *recommended* by an engineer official connected with the Treasury? Mr. Rawlinson belongs to a school which for many years applied very hard words and imputed very base motives to all who differed from their sanitary theories. In his day he has given, and he must be content—as they say at Eton—"to take, a licking now and "then."

Circular to Gas Companies.

The metropolitan gas question has assumed a new phase. The Metropolitan Board of Works threaten to re-enact the part of the Corporation of the City of London, whose proceedings at the commencement of the last session of Parliament they prudently determined to watch and wait; and they are about to be urged by their Gas Committee into action, without waiting any longer. That energetic and impatient committee, being too restless to remain quiet until the result of the operation of the City of London Gas Act can be known,

have agreed to a report recommending the Board to purchase the whole of the London gas-works. The terms on which it is proposed to effect that gigantic operation have not yet been made public, for the presentation of the report, which was expected at the last meeting of the Board, has been deferred until the ordinary meeting on Friday next. On that day, however, the adjournment for the recess is to take place, and it is not probable that any further progress will be made in the matter until the meetings of the Board are resumed; therefore the gas companies and the vestries and district Boards will have time to consider the question, and determine their respective courses of action. The gas companies have been so much worried by the persistent attacks on them during many years past, that they may be tempted by a liberal offer to realize their property and embark in some other undertakings less exposed to annoyance from popularity-hunting agitators. The terms sanctioned by Parliament for the transfer of the works of the electric telegraph companies to the Government—twenty years purchase of their respective undertakings and liberal compensation to the officers whose services may not be required—would, we have little doubt, be generally accepted by the metropolitan gas companies, and the precedent would equally apply to the transfer of their property. The proposed purchase is, however, likely to meet with strong opposition from the local Boards and the vestries, who, despite the oft-cited examples of the great advantages derived from the supply of gas by public bodies, have a shrewd suspicion that their interests as gas consumers and ratepayers would be better promoted by having the supply of gas in the hands of the companies. The parish of St. Pancras has already raised its voice against such a scheme. At a meeting of the vestry, the members of the Metropolitan Board who represent the parish condemned the principle of the Board becoming manufacturers and sellers of gas; and it was said that, unless there was some public demonstration against it, "an enormous job would be perpetrated." A resolution protesting against the purchase, and requesting their representatives at the Metropolitan Board to oppose it by every possible means, was carried unanimously; and also a resolution for the appointment, at the request of the St. James's vestry, of five delegates to consider the whole of the metropolitan gas question. The vestry of the important parish of St. Marylebone have also instructed their representatives at the Metropolitan Board to oppose the scheme; and many similar demonstrations against it will, no doubt, be made when it is found that the purchase of all the London gas-works may probably cost ten or twelve millions of money, instead of seven or eight, as mentioned at the meeting of the St. Pancras vestry. The interest on borrowed moneys, and the prescribed dividends of the thirteen metropolitan gas companies, were stated in 1867 to amount to £605,157, the capitalization of which, at 20 years purchase, would exceed £12,000,000.

The determined onslaught by Mr. Cardwell's committee on the rights of property of the metropolitan gas companies has, it is to be feared, formed a precedent for further attacks; and the proposition to be submitted for adoption by the Metropolitan Board of Works on Friday next may be regarded as the offspring of Mr. Cardwell's recommendation. The harshness—not to say injustice—with which the gas companies were treated by that gentleman, as chairman of the committee, could not fail to have struck any impartial person who was present during the proceedings; and the following remarks of the *Saturday Review* correctly represent the character and effect of the measures adopted by the committee acting under his guidance:—

> The contest in which the London gas companies have long been engaged was practically decided against them by a committee which, under Mr. Cardwell's guidance, forced the City companies to submit to a large and arbitrary modification of their former contract. The Corporation of London, as unmindful as Burke's Duke of Bedford of the designs of reformers on its own property and privileges, sought to acquire popularity by promoting, in pursuance of Mr. Cardwell's suggestion of last year, a Bill for establishing gas-works of its own on ruinous terms, which would have effectually crippled all competition by existing companies. Having obtained the requisite leverage, Mr. Cardwell used his opportunity with comparative moderation, by compelling the City companies to surrender a considerable portion of their profits on pain of utter destruction. The other metropolitan companies await their time, in a vague hope that the Metropolitan Board of Works may be unable or unwilling to follow the example of the corporation. The most equitable termination of the dispute would be the purchase on fair terms of the property of the companies. If the state or municipal bodies wish to undertake enterprises which have been commenced with private capital, they ought, in conformity with principle and precedent, to provide compensation to the expropriated adventurers. The violent measure of the City Gas Bill hitherto stands alone as an instrument of coercion.

We insert in another column the report of the Special Gas Committee to the Court of Common Council of their proceedings in reference to the Corporation Gas Bill and the City of London Gas Bill, in which the progress of those measures through both Houses of Parliament is described, and the results obtained are set forth with due regard to making the most of what has been done by the committee to win the gratitude of their fellow-citizens and its appropriate acknowledgments. In reviewing the labours by which they have "endeavoured to secure cheap and good gas for the citizens," the committee speak as if "alone they did it;" and they proceed to enumerate some of the principal advantages "we "have been able to secure;" but omitting altogether to notice the cost at which those advantages have been obtained. They take credit to themselves for all the provisions of the City of London Gas Act relating to the regulation of the supply, the quality of the gas, and the investigation of the accounts—which were comprised in the Metropolis Gas Act Amendment Bill of the previous session—as well as for the provisions regarding the price and illuminating power, which are to be tried experimentally in 1870. Of the result of that experiment the committee express great confidence, observing that if at the end of that year "any change be made, it will be in "the way of reduction in the price." They even assume to have done good service to the public by contributing to define the burner by which the illuminating power of the gas is to be determined; that question, it is said, having been "one of "the most difficult subjects in gas legislation." The committee seem not to be aware of the fact that that really valuable part of the Act is the only provision it contains favourable to the gas companies, for the burner is to be such as shall be most suitable for obtaining from the gas the greatest amount of light, and be practicable for use by the consumer. The assumption of merit by the committee, towards the conclusion of their report, when congratulating the Court of Common Council on the result of their labours, deserves to be reproduced as a choice example of self-laudation:—

> Your committee congratulate the court on the satisfactory termination of the contest in which we have been engaged during three sessions of Parliament. In this contest your committee had to contend, not merely with the City gas companies, but with the combined parliamentary power of the gas interest of the whole country. Your committee believe that the result of their labours will be to secure for the gas consumers of the City an abundant supply of gas of a high illuminating power, and at a moderate price; and that a question which has long been a subject of great interest to the citizens has at length received a satisfactory solution.

The works of the Independent Gas Company at Haggerston having, in the course of years, become surrounded by a somewhat dense population, those who have collected round the gas-works now complain of them as a nuisance, and have applied to the local authority to provide a remedy. The vestry of Shoreditch, thus appealed to, applied to Mr. Samuel Hughes to ascertain whether any unusual nuisance exists, and, if so, in the fulness of his wisdom to advise how to remove it. The report of that gentleman, read at a recent meeting of the vestry, offered various suggestions on the subject, the crowning suggestion of all being that the works, with the exception of the gasholders, should be abandoned, and that the Independent Company should obtain their supply of gas from the Chartered Company's new works at Barking Creek, when constructed. He also suggested that the same remedy should be applied to remove the nuisance of all gas-works in crowded sites. If that recommendation were adopted to the full extent the whole of the gas manufacture of London would be transferred to the proposed new works of the Chartered Company, and the other gas companies would be supplied by them with gas in bulk. Such an arrangement might, it is true, dispose of the alleged nuisance arising from the manufacture of gas in the district where it is distributed, but it would be attended with some disadvantages, the consideration of which Mr. Hughes seems to evade. In the first place the illuminating power of the gas would be diminished in its passage through such a length of mains; and, furthermore, the important consideration of the increase of price would seriously interfere with such a scheme. The Chartered Company would, of course, require a profit on the gas they might supply, in addition to the profit the Independent, or any other company taking a supply in bulk, would require for interest on the capital expended on their existing works, which works would be rendered unproductive. It is a very simple remedy of any nuisance to remove it, but the cost of the removal may be greater than the advantage to be gained would compensate; and it is quite clear, in the case of the Independent Company, that those who built houses round the alleged nuisance have no right to complain. Mr. Hughes's suggestion

calls to mind a project for preventing the smoke nuisance in manufacturing towns by removing all the boilers and establishing monster steam-generators in the Staffordshire coal districts, from which steam might be supplied to the engines in all parts of the country.

A meeting of the shareholders of the Chartered Company has been called to authorize the issue of £300,000 in debentures, for the purpose of commencing the erection of the new works at Barking Creek, from which Mr. Hughes proposes to supply all the gas companies of the metropolis. It is not stated whether it is proposed to raise the sum by debentures or by debenture stock. Railway and water companies have found the latter form to be not only the cheapest mode of raising money, but the safest for the holders of ordinary shares.

The injunction to restrain the Cambridge Gas Consumers Company, Limited, from opening the streets of that town, for the purpose of laying down their mains, was issued by Vice-Chancellor Malins on the 29th ult., after an ineffectual attempt on the part of the company to delay it. As the equity courts have now adjourned for the long vacation, there will be no opportunity for reversing the judgment by appeal until the courts meet again in December. At the request of many of our readers we have reprinted in a separate form the report of the proceedings in this important case.

The accounts of the metropolitan gas companies for 1867 have been printed at an earlier period of the year than usual, though they were not issued in time to enable us to present our usual tabular analysis of them in the present number. The maximum price of common gas supplied in town districts was in all cases, with the exception of the London and the Ratcliff Companies, 4s. per 1000 feet, and for cannel gas 5s. 6d., yet, notwithstanding this general reduction in price, the gross annual gas-rentals of eleven of the companies exceeded those of the preceding year, the exceptions being the City of London and the Surrey Consumers Companies, but only to a small extent. The gas-rental of the Imperial Company amounted to upwards of half a million (£507,000), being an increase of £29,968 on the previous year; the Phœnix Company's accounts show the greater proportionate increase of £15,485 on a rental of £171,029; and the Western Company an increase of £10,757 on the comparatively small rental of £94,692. All the companies, with the exception of the Chartered, have paid their prescribed dividends, but, to enable the Imperial Company to do so, they had to draw on their reserve-fund to the extent of £37,964; and in the case of several of the other companies the balances carried over last year have been nearly absorbed. We shall enter more fully into an examination of the accounts in our next number, with the tabulated analysis.

Correspondence.

PUBLIC LIGHTING AT READING.

SIR,—As I have lately received several inquiries respecting the mode of supplying gas to our public lamps, under the "average meter system," it may be interesting to many of your numerous readers to know that the "average meter system" has been abandoned for some months past, and that the company have again taken the lamps entirely into their own hands under a contract for five years, at a stated amount per lamp per annum.

EDWARD BAKER.

Gas Office, Reading, July 31, 1868.

MR. RAWLINSON AND HIS PROTÉGÉ.

SIR,—Do you think that anything but sinister purposes are served by such notice of myself as that in your JOURNAL of the 21st inst.? There is, however, a maxim—"Throw mud enough," &c. Is it a crime in me to have a "favourite sanitary engineer?" You proclaim to your world that Mr. John Lawson obtains a large share of sanitary work, and I individually am very glad to learn the fact from so competent an authority. Did it, however, on any occasion occur to you to inquire how that work has been done? Because in the answer a partial justification is involved. You more than insinuate that I use my official influence improperly, and to my pecuniary benefit, in favour of Mr. Lawson. Do you consider that you are justified in such a course unless you are prepared with proof of the fact, and, if you have such proof, will it not be better to make my criminality apparent to the public? You will not, probably, believe that in nine cases out of ten I know nothing whatever about Mr. Lawson or about his works until I hear of them through your paper or through some similar channel; but I beg to assure you it gives me true pleasure to learn that he is so well employed, both for his own sake and for the sake of those who employ him. You, Mr. Editor, are a man of the world, and cannot, I feel sure, believe that any man who is incompetent can be praised and bolstered up permanently by any individual. If you say that I, holding an official appointment, have no right to recommend any man when asked to do so, I say that I differ from you. I have done so, and will do so again.

London, July 27, 1868. ROBERT RAWLINSON.

Register of New Patents.

2351.—AUGUSTUS FRASER BAIRD, of Pimlico, in the co. of Middlesex, lieutenant-colonel in the Bengal Staff Corps, for "*An improved earth-closet.*" Patent dated Aug. 15, 1867.

According to this invention a receptacle is placed beneath the seat for receiving the deposits with which the earth is to be mixed, with a shoot or passage opening into the said receptacle for conveying the earth into the same, and at the other end to that above mentioned another opening is made, by which the earth is supplied from a hopper to the said shoot. The bottom of the hopper, being curved and provided with the last-mentioned opening for communication with the shoot, is opened and closed by the action of a sector-piece or other valve weighted as a counterbalance, such piece or valve being secured to and forming part of a flap or valve hung at the centre, the office of which flap or valve is to close the opening from the shoot into the same receptacle first mentioned, the same being effected by means of a projection from the centre of the said flap or valve, situate just beneath the seat of the closet, so that when at rest the sector-valve closes the entrance from the hopper to the shoot, and prevents the discharge of earth into the said shoot; and when the closet is used the weight of the sitter presses the seat on the said projection, and thus gives motion to the valve arrangement, and opens the entrance from the hopper to the shoot, shutting the entrance to the receptacle for deposits, thus causing the shoot to be filled up with earth, which is to be discharged therefrom into the receptacle by the removal of pressure by the sitter getting up from the seat. The sector-valve has a rod or rods attached to it, working in the hopper to prevent the consolidation of the earth and cause it to remove as required.

2408.—ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the co. of Middlesex, for "*Improvements in apparatus for raising water or other liquids by steam power.*" A communication. Patent dated Aug. 22, 1867.

This invention consists in the use of a floating piston within a stationary cylinder, the piston being alternately depressed by the steam and elevated by the water, the steam being condensed by the water as soon as the piston is down, so that thereby the piston is relieved from the pressure of the steam, and is free to be acted upon by the water. With a proportionately small amount of steam power a large column of water can by these means be elevated to a considerable height.

2402.—THOMAS SAULT, of New Haven, Connecticut, U.S.A., now of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, engineer, for "*Improvements in slide-valves.*" Patent dated Aug. 22, 1867.

This invention relates to means for preventing friction between a slide-valve and its seat or bearing, and the consequent wearing of the surfaces of the same. The improvements consist chiefly in supporting the valve upon rollers provided with means for adjustment, whereby the proximity of the valve to its seat can be regulated with great facility and accuracy.

2414.—JAMES LEE NORTON, of Belle Sauvage Yard, Ludgate Hill, in the City of London, and GEORGE HAWKSLEY, of Montrose Villas, Caledonian Road, in the co. of Middlesex, engineer, for "*Improvements in apparatus and means for burning combustible liquids, vapours, and gases to obtain heat and light therefrom.*" Patent dated Aug. 22, 1867.

A suitable jet is produced by forcing the liquid by a heavy pressure between two surfaces, which are exceedingly close together, but which can separate or be separated to discharge any impurity from between them, and to regulate the flame. It is preferred that these surfaces should be held together by a spring, and that the liquid should be compelled to force its way between them, overcoming the spring. The orifice employed is formed by a conical valve and valve-seat of hardened steel, and a spring adjustable by a screw holds the valve against the seat until it is overpowered by the liquid striving to lift the valve and escape. When the pressure of the liquid and the tension of the spring are suitably adjusted, the required smoke-like jet is readily adjusted. It may be ignited, and, if desired, directed into a furnace, or against any article it is required to heat.

2422.—JOHN VARLEY, of 57, Bloomsfield Road, Plumstead, in the co. of Kent, for "*Improvements in apparatus for raising, supplying, and measuring water to steam-boilers, part of which invention is also applicable to measuring water for other purposes.*" Patent dated Aug. 23, 1867.

In order to supply water to steam-boilers a closed cistern of a given capacity is erected in a convenient position above the boiler. At the bottom of this cistern, and in connexion with it, is another vessel of comparatively small capacity; this vessel is carried to a trunnion, on which it is able to rock, and through which water passes from one vessel to the other. In order that the water may flow freely from one vessel to the other a small pipe is led from the top of the rocking vessel to the top of the cistern. When the rocking vessel is empty it is held up by a counterbalance weight, but when the vessel is full, or nearly so, the weight is overbalanced and the vessel descends. Above the cistern is a small case or box, from the bottom of which a water-supply pipe passes into the cistern. The top of the case or box is also connected by a pipe with the top of the cistern, and

within the cistern each of these pipes is fitted with a valve. A steam-pipe from the boiler is connected to the upper part of the cistern, and the end of this pipe within the cistern is also fitted with a valve. These three valves are all worked by the rocking vessel above mentioned, so that when the latter is in its highest position the valves on the water-supply pipe and on the pipe which connects the top of the case or box with the top of the cistern are open, whilst the valve on the steam-pipe is closed; but when the rocking vessel descends the valve on the steam-pipe is opened, whilst the other valves are closed. There is also a valve at the bottom of the cistern on a pipe leading to the boiler, and dipping beneath the water in it. This valve is counterbalanced, so that it requires to open it a column of water somewhat longer than the distance between the water-line in the cistern when full and the high water-line in the boiler.

2434.—William Berry, of 4, Willow Place, Stamford Hill, in the co. of Middlesex, for "*Improvements in the means or apparatus for removing mud, drift, or other rubbish from streets and other places.*" Patent dated Aug. 24, 1867.

This invention consists, first, in using an inclined plane and receiver mounted on a frame on one or more wheels, slides, or other means; the lower end of the inclined plane is to be near the ground, so that mud, drift, dust, &c., may be swept up into the receiver, and afterwards emptied into the cart or other receptacle by a weighted lever or other means. Second, an inclined plane and receiver may be attached to the cart or other receptacle by pivots, &c., so that the contents may be readily emptied into the cart or other receptacle.

2435.—Walter Christopher Thurgar, of the city of Norwich, surgeon, for "*Improvements in apparatus for regulating the supply of gas to burners.*" Patent dated Aug. 26, 1867.

This apparatus is actuated by clockwork which is wound up once a week, or at other convenient intervals of time. The clockwork drives a spindle which turns once an hour. This spindle has one tooth on its end, which tooth acts upon one tooth of a 24-cogged wheel which it gears with. This 24-cogged wheel has a spindle through its centre of suitable length, and fixed on the top of this spindle is a plate which has two arms, one of which is fixed while the other is adjustable for increasing or diminishing the distance of the two arms, according to the time of gear, the plate being marked to show the position to which the adjustable arm should be moved. This plate revolves horizontally once in 24 hours, and as it revolves one of the arms presses one side of a cam, of which there are two fixed on one end of the tap which runs through the vertical gas-pipe; the tap has a small groove round the perforation, so that the gas gets through a little in the daytime. When the cam is acted upon, it turns the tap so as to lower the flame, and when the other arm comes round, it comes against another part of the same cam, so as to turn the gas on full. The small blue flame which burns in the daytime is protected from the air by a guard, which is pressed up by one cam in the morning, and again lowered by the arm coming against the other cam in the evening. This guard is a globe which has perforations at the bottom to let air in; the globe has a tube fixed at the bottom, and on the other end of the tube is a small plate, by pressure on which one of the cams (being fixed to the tap) lifts up the guard to shield the small blue flame in the daytime. The guard tube fits over the gas-pipe.

2531.—James Joseph Hicks, of Hatton Garden, in the co. of Middlesex, for "*Improvements in means or apparatus employed for lighting gas and other jets or lamps, candles, cigars, and other articles.*" Provisional protection only obtained. Dated Sept. 7, 1867.

In this invention a tube is employed closed at one end and open at the other. An opening is provided at any convenient part, through which the tube is supplied with any suitable liquid for burning; this opening may be closed in any suitable manner. In the open end of the tube or reservoir is placed a cotton wick, which extends down into the tube or reservoir, the end of which may be curved or shaped into any suitable form. When the wick is lighted the apparatus is ready for use, and, if desired, will continue burning for a considerable period.

2536.—Emile Hubner, of 13, Rue Gaillon, Paris, in the empire of France, engineer, for "*An improved rotary steam or gas engine, also applicable for pumping and measuring liquids.*" Provisional protection only obtained. Dated Sept. 7, 1867.

A wheel of large diameter is employed, in the circumference of which is made a rectangular hollow groove, turned on each face, within which is placed a heavy semicircular metallic ring, adjusted to slide easily within the groove. This semicircular ring acts both as a piston and a cylinder bottom, and its object is to counterbalance by its weight the pressure of the steam introduced in the hollow grooves. A certain number of sluices are adapted so as to intersect transversely the hollow part of the groove. They are put in motion by an eccentric loose on the shaft of the wheel, and maintained in the requisite position by a worm. The rods which unite the sluices to the eccentric are each provided with a piston working in a cylinder. The object of these pistons is to regulate the introduction of the steam, its expansion, and its escapement.

2539.—Benjamin Franklin Stevens, of 17, Henrietta Street, Covent Garden, in the co. of Middlesex, gentleman, for "*An improved illuminating roof and roof pavement.*" A communication. Patent dated Sept. 7, 1867.

This invention has reference to the construction of illuminating roofs, to the mode of uniting such roofs with the side walk or footway, and to the mode of utilizing the light obtained through such roof pavement for the illumination of the basement room or other locality situate below the level of the pavement.

2548.—Clinton Edgcumbe Brooman, of the firm of Robertson, Brooman, and Co., of 166, Fleet Street, in the City of London, patent agents, for "*A new process for producing hydrogen.*" A communication. Patent dated Sept. 9, 1867.

This invention consists in the employment of the alkaline and alkaline and terous hydrates named, mixed in a chemically defined proportion or without a determined proportion with various mineral or vegetable combustible matters, in order to produce at a red heat, in contact with these matters, hydrogen suitable for lighting and heating, and this in such apparatus of distillation and calefaction as it may be found convenient to employ, such as retorts, crucibles, and the like.

2549.—Frederick Tolhausen, of 149, Boulevard Magenta, Paris, in the empire of France, patent agent, for "*An improved process and apparatus for instantaneously disinfecting fœcal and manuring matters, improving the same, and also rendering them fit for feeding domestic animals.*" A communication. Patent dated Sept. 9, 1867.

This invention relates to a process and apparatus for disinfecting instantaneously fœcal and stercorous matter, and dejections of every description, by mixing or combining them as soon as produced with various disinfecting powders, consisting of mineral and vegetable substances.

2564.—James Rae, of Lower Sydenham, in the co. of Kent, engineer, for "*Improvements in portable apparatus for cleansing and filtering water for army and other purposes.*" Patent dated Sept. 10, 1867.

This apparatus consists of a double cistern of metal carried on a suitable framing or cart-body, mounted on wheels for the purpose of transportation. The bottom of each half of the cistern inclines downwards, and has a central well or channel, provided with a pipe or cock at the bottom for drawing off the sediment. The cistern is supplied with water from any source, such as from a pond when on the march, for instance, either by a hand-pump placed on the ground or fixed at any point on the cart outside the cistern. In the well or bottom of the cistern is placed a filter, open at top and bottom, and enclosed in a casing in such a manner that the water entering from below will pass through the filter and then into the casing, with which delivery-pipes extending at the back of the cistern are connected, provided with taps for drawing off the cleansed and purified water. The cistern may be mounted on two or more wheels, and fitted with one or more filters.

2618.—Thomas Bell, of Hampstead, in the co. of Middlesex, for "*Improvements in treating the oxide of iron residues of gas purifying, in order principally to extract sulphur therefrom.*" Provisional protection only obtained. Dated Sept. 17, 1867.

According to this invention the oxide of iron residues are treated with bisulphide of carbon, by which the sulphur is taken up from the oxide. As much bisulphide of carbon as possible is afterwards drawn off from the oxide residue, which is again and again treated in a similar manner with fresh bisulphide until there is no sulphur remaining in it. The remaining bisulphide is afterwards distilled off and so recovered, leaving only cyanides and a few other impurities in the oxide of iron which may be afterwards burnt off, or otherwise removed. To obtain the sulphur from the bisulphide of carbon it is subjected to distillation, by which the bisulphide is driven off and recovered to be again used, and the remaining sulphur may be afterwards melted and formed into cakes or bars for use.

2621.—Alexander Melville Clark, of 53, Chancery Lane, in the co. of Middlesex, for "*Improvements in valve closet apparatus, part of which is applicable for regulating the flow of water in other cases.*" A communication. Patent dated Sept. 17, 1867.

This invention consists, first, in the application to water-closet apparatus of an elastic valve of peculiar construction as a substitute for the arrangement now in use. Second, in means of regulating the pressure of the water in the pipes, which is also applicable for regulating the flow of water in other cases. Third, in the application to water-closets generally of means of separating the solid and liquid matters in the basin itself. Fourth, in the application of a cock for regulating the pressure of the water from the mains, which also regulates the supply to the basin.

2629.—Richard Watson, of Liverpool, in the co. of Lancaster, fireproof safe manufacturer, for "*Improvements in apparatus for distributing gas for heating and lighting.*" Provisional protection only obtained. Dated Sept. 19, 1867.

This invention relates to distributing gas for heating and lighting to places at a distance from gas-works. For this purpose there is erected at or in communication with gas-works a strong metallic vessel, called the container. By a pump or a series of pumps, the one delivering into the other, or by water pressure or other means, the gas is forced or compressed into the said container, and a high-pressure is maintained therein. A number of taps or valves are fitted into the said container, through which the high-pressure gas is delivered into portable vessels called the distributing-vessels, which are filled from the container and are carried to the places where the gas is required. They are made of metal of a cylindrical or other suitable shape, and are provided with taps or valves and connexions corresponding to those on the container, so that they can be easily and quickly coupled on to and disconnected therefrom. Lamps to which the said distributing vessels are connected at the place where the gas is to be burnt, or the said vessels themselves, are fitted with means for controlling or cutting down the pressure to a proper burning point, and such means consist in fitting into a small vessel in the delivery-pipe, or in an enlarged part of the delivery-pipe, sponge or other porous and compressible material. The gas in its passage to the burner, by first coming into contact with one side of the said sponge or other material, compresses it and reduces the area of the openings therein more or less in proportion to the pressure, and so allows at all times only the required quantity to pass to make proper combustion. Should the sponge or other material not be sufficient to cut down the pressure low enough, an ordinary gas-burner or an intercepting diaphragm with a small opening therein can be inserted in the delivery-pipe between the distributing-vessel and the sponge or other material to assist in reducing such pressure. In cases where the distributing-vessels employed are large and unwieldy the gas is

delivered into smaller portable vessels fitted with taps and burners of such a size that they can be carried about by hand.

2641.—William Potts, of Handsworth, in the co. of Stafford, manufacturer, for "*Improvements in apparatus for ventilating rooms and buildings.*" Patent dated Sept. 20, 1867.

This invention consists in constructing and arranging in the cornices of rooms and buildings, or at the highest convenient part of the room or building, two independent or separate channels, situated at different levels, the upper one serving to collect and remove the hot and vitiated air from the room or building, and the lower one serving to introduce cool and pure air into the room or building, the hot and vitiated air entering its channel, and the cool and pure air passing from its channel through ornamental or other perforations or wire gauze.

2643.—Louis Lenzberg, of Oxford Street, in the co. of Middlesex, gas engineer, for "*Improvements in gas-lamps and burners for the same.*" Patent dated Sept. 20, 1867.

This invention has for object the increasing the illuminating power of gas in outside and inside gas-lamps, and consists—firstly, in adapting to gas-lamps a reflector similar to that used in "sun lights" of metal or earthenware, enamelled, silvered, painted, or glazed, or prepared with any other suitably reflecting surface, and of a conical, hemispherical, or other suitable shape, in combination with the ordinary sunlight burner, or with the improved burner hereinafter described. Secondly, in an improved burner. The reflector and burner are placed inside the lamp-frame, one or more openings being left in the reflector for the escape of heated air. Spaces or openings are left or made around the lamp-frame to form a current for carrying off the heated air and for cooling the reflector. The lamp-frame is so constructed that its top or bottom is removable or moveable on hinges to permit of cleaning or repairs. The lamp may be constructed so that the reflector forms the top of the lamp; the lower part of the frame is in this case attached to the reflector itself, proper spaces being left in the bottom of the lamp-frame and also between the bottom of the reflector and the frame, or in the bottom of the reflector. The reflector may be made with an outer cover or jacket, with an intervening space for the purpose of reducing the heat by the introduction of air or of a cooling substance, such as sand, clay, or other cooling substance. The improved burner is hollow, and is made of fire-clay, or metal and fire-clay combined, of a circular or other suitable form, its horizontal periphery or edge being perforated according as it is required to produce a fishtail, bat's-wing, or other light of intense brilliancy. In some cases an ordinary burner may be adapted to the outside of the reflector to throw a light upwards, or the reflector may be so formed as to produce the same effect, or glass or other suitable reflectors may be adapted to the bottom of the lamp.

2665.—Angus Mackenzie, of Capel Street, Dublin, plumber, and Samuel Robinson, of Brunswick Street, Dublin, foreman builder, for "*Improvements in apparatus to be applied to cisterns for preventing waste of water.*" Patent dated Sept. 21, 1867.

In applying this invention to water-closet cisterns a gauge-chamber is constructed inside the cistern, at the lowest part thereof, of sufficient capacity to contain the requisite amount of water for one flushing of the closet. A small aperture is made in the side of this chamber at the bottom for filling the same from the surrounding water in the cistern, such aperture being opened by the act of closing the principal valve of the cistern, and closed when such valve is opened, a small inlet-valve being employed for that purpose adapted to the aperture referred to. At the bottom of the gauge-chamber there is fitted the valve-seat and valve, opening either into the old service-box, or into a supply-pipe leading direct to the basin. This valve is provided with a tubular spindle, having a piston, being connected to a float inside the closed chamber before referred to, and on the lower part of the piston is formed a valve cap, and on the upper part of the tubular spindle through which the piston works there is formed a valve-seat, so that, when the piston is raised by the float to a given height, the second passage for water (namely, the passage through the tubular spindle) is closed, and remains closed until, by the opening of the principal valve, the chamber is emptied. This piston is further coupled by a wire to the usual overhead weighted lever which is connected to the "pull" or handle of the closet. The object of the entire arrangement is, first, to admit the full complement of water in the closed chamber to pass down through the principal valve when opened; and, second, to permit of a certain gauged or regulated quantity of water, sufficient to fill the pan of the closet, to descend through the tubular spindle of the main-valve after it has been closed. This latter is the result of the quantity of water admitted to flow through the small open aperture being in a certain proportion in excess of the quantity which can pass down through the tubular spindle or piston-valve, and, consequently, the chamber will in a short time become nearly full, and the float raised so as to close the inner valve. This float, however, is not sufficiently bouyant to open the principal valve.

2668.—Adam Aitchison, of Wilton Terrace, Peckham, gas engineer, and Henry John Grantham, of Dockhead, Bermondsey, both in the co. of Surrey, for "*Improvements in the production of carburetted gas, and in the apparatus and burner applicable thereto.*" Patent dated Sept. 21, 1867.

This invention relates to certain improvements in the method of producing carburetted gas, and in the apparatus and burner to be employed therein. The carburetted gas is produced by causing ordinary gas to be mixed with hydrocarbon vapour by improved means. It is well known that ordinary coal gas has been caused to traverse or pass through receptacles containing hydrocarbons previous to its arrival at the burners, by which means the coal gas has been more highly carburetted and its illuminating power has been increased. According to this invention a hollow globe of brass, gun metal, or other suitable metal, is constructed, at the top of which an outlet-pipe and burner is to be screwed, and at the side of the globe or the bottom an inlet-pipe is to be screwed; the interior of the globe is provided with a tube of wire gauze or a tube of metal perforated with a number of fine holes placed vertically, and extending from the exit-pipe to the lower inlet-pipe; and surrounding this gauze or perforated tube is an absorbent material, such as cotton wool, or sponge, cork, wood, or other suitable material, which fills up the globe around the vertical gauze or perforated tube. At the lower part of the gauze or perforated tube a piece of sponge, or cotton wool, or other absorbent material is deposited, and the hydrocarbon liquid is poured into the globe by the medium of the gauze or perforated tube (the upper part of the burner being previously unscrewed). The hydrocarbon will thus saturate the absorbent material, and the remainder of the liquid may then be poured off and returned to the receptacle from which it was drawn. The upper part of the burner is then to be screwed on, and the inlet-pipe turned on, when the gas will intermingle with the hydrocarbon vapour and flow out of the burner, where it will give out a light equal to that of 30 candles, and at one-half the cost of the ordinary gas. The apparatus may be screwed on to the gas-pipe at a distance from the burner, if required, but the burner may be attached to the apparatus so as to form a burner and carburetter in one. It is proposed to saturate the absorbent material with benzone, photogene, paraffin, or other hydrocarbon; and, if the inlet-pipe is at the side of the globe, the gas will pass through the absorbent material into the space left by the gauze or perforated tube, taking up a quantity of hydrocarbon vapour and forcing it through the burner. If the inlet-pipe is at the bottom of the globe, the gas will pass through the saturated material within the gauze or perforated tube, and mingle with the vapour. By these arrangements an economical carburetting gas-burner is produced, affording a pure and brilliant light far superior to take of ordinary coal gas.

2674.—Charles Ritchie, of Brixton, in the co. of Surrey, gentleman, for "*Improvements in apparatus for regulating automatically the supply of gas, air, and water, or any one or more of them, to steam-boilers heated by gas or otherwise, and for utilizing the heat of the gases produced or heated by combustion.*" Patent dated Sept. 23, 1867.

According to this invention a small cylinder or receptacle is constructed or attached to the boiler at any convenient part thereof, one end of which is in communication with the boiler. Within this cylinder or receptacle is a piston or valve, provided with a spiral or other spring of suitable tension or pressure, to which piston or valve, or to its rod, is or are connected in any suitable way a weight or weights, which tend to force it downward in the cylinder or receptacle, in opposition to the steam which passes from the boiler into the said cylinder or receptacle. The rod of this piston or valve is connected by a lever and toothed wheels, or in any other convenient way, with (in the case of a boiler heated by gas) the tap or other contrivance which regulates the supply of gas, and also with the tap or other contrivance which regulates the supply of atmospheric air, so that, when there is too great pressure of steam within the boiler, the supply of gas is lessened or cut off, and the supply of air is at the time regulated, as may be required, for the support of combustion, or for cooling down the contents of the boiler, in order that the water may not be prevented by excess of pressure of the steam from entering the boiler from the cistern, or any other source of supply that may be used; and also that the pressure of the steam when it becomes too great may be lessened; and that when a damper is used to regulate the air pressing into or from the furnace, this damper may be opened or closed by the piston or valve arrangements above mentioned.

2677.—William Cooke, of 24, Jermyn Street, St. James's, in the co. of Middlesex, for "*Improvements in apparatus for the regulation of up and down currents of air.*" Provisional protection only obtained. Dated Sept. 23, 1867.

This invention consists of an apparatus that effectually regulates the up and prevents the down draught in shafts or chimneys by the application of outer flanges or breaks to an upright tube or shaft, open at both ends, having angular or other shaped openings in the sides, with inner tubes perpendicularly arranged, so as to direct the upward current of the air or smoke, permitting it freely to ascend; the whole apparatus acting as an exhauster of the air, facilitating the upward current, the openings at the sides serving as escapes for the downward current.

2686.—Hugh Forbes, of 184, Euston Road, N.W., parish of St. Pancras, in the co. of Middlesex, for "*Improvements in the construction of rotary pumps.*" Patent dated Sept. 24, 1867.

This invention consists, first, in forming the outlet aperture of the pump-casing as a narrow slit of equal width at all points, and with rounded ends, substantially as and for the purposes set forth. Second, forming the inlet aperture of the pump-casing as a narrow slit of equal width at all points, substantially as and for the purposes set forth. Third, the employment of the dome described and shown in the drawings, for conducting the water from the long narrow outlet aperture of the pump-casing to the circular discharge-tube.

2688.—George Batcheldor, of Liverpool, in the co. of Lancaster, cement manufacturer, for "*Improvements in trough water-closets.*" Patent dated Sept. 24, 1867.

The object here is to provide trough water-closets at a less price, with rounded surfaces, or surfaces sloping towards the outlet-valve, and in part—that is to say, as regards the trough part—of non-absorbent and more durable materials than those now in use. For this purpose the troughs are made or constructed of earthen or stoneware, and in or over the soil-pipe leading therefrom there is fixed or formed a valve-seating, the valve of which is connected to a lever or its equivalent, and is led into a locked-up space, the key of which is in the possession of a person whose duty it is to see that, from time to time, the trough is emptied and flushed. The seats are of the ordinary form.

2692.—THOMAS HENRY WILLIAMS, of 20, Cecil Court, St. Martin's Lane, in the parish of St. Martin, in the co. of Middlesex, for "*The improvement of gas-burners.*" Patent dated Sept. 24, 1867.

This invention consists in the application to gas-burners of a small metallic vertical disc or plate, arranged above and across the centre of the nipple, the object being to divide the jet of gas and consequent flame, thereby increasing the light by causing a larger quantity of oxygen from the atmospheric air to mingle or combine with the gas and flame, and effecting complete combustion of the coal or other gas, and also preventing the rushing or humming noise so common in ordinary gas-burners.

2694.—CHARLES DENTON ABEL, of 20, Southampton Buildings, Chancery Lane, in the co. of Middlesex, patent agent, for "*A new or improved method and apparatus for converting the gaseous products of combustion into combustible gases.*" A communication. Patent dated Sept. 25, 1867.

This invention has for its object to utilize the waste heat of furnaces and fireplaces, and consists mainly in employing such heat to effect the regeneration of the gaseous products of combustion from the furnace or fireplace that is to convert such gases, which consist mainly of carbonic acid and vapour of water, into combustible gases, such as carbonic oxide and hydrogen. For this purpose the products of combustion are made to pass from the furnace partly through a cylinder of refractory material filled with carbonaceous matter, and partly through a space surrounding the cylinder, so as to heat the carbonaceous matter it contains. By this means that portion of the gases which passes through the cylinder is converted into combustible gas, which may be used for heating purposes, either in the same furnace or elsewhere. The other portion of the gases, after imparting a portion of their heat to the contents of the cylinder, is conducted into a chamber where they are employed to heat the air required for the furnace.

2700.—GEORGE CLAYTON and WILLIAM MARBECK, both of Leeds, in the co. of York, for "*Improvements in water-meters.*" Provisional protection only obtained. Dated Sept. 25, 1867.

Upon a cylinder of small dimensions—say, 2 inches diameter by 6¼ inches in length—is placed a valve-chest, having ports similar to those of an ordinary steam-engine slide-valve—that is to say, two inlet-ports connected by the valve itself with an exhaust-port. The valve is worked from a small transverse shaft passing through the admission-chamber, and connected with it by catch levers attached on the outside to a bearing, having an angular toothed formation, and supported by small runners projecting from the side; they impart to a longitudinal shaft extending the whole length of the cylinder, and connected to force-pistons working through the ends of the same, a reciprocating motion. A water-piston works freely within the cylinder. This latter piston is constructed of two metallic plates perforated, and having a ferrule to keep them apart, whilst leathers are flanged outwards and secured in the centre of the piston, the flanges being kept tight against the cylinder by the water admitted through the perforations. The action is as follows:—The water is admitted alternately by each port, and by the alternate or reciprocatory action of the pistons fixed in the ends of the cylinder; the water-piston (so termed for distinction sake) accordingly forces out the water through the several ports, each stroke of course indicating a given amount of water, which is registered by any of the ordinary clock apparatus used for such indications.

2701.—WILLIAM WOODCOCK, of Pimlico, in the co. of Middlesex, engineer, for "*Improvements in apparatus or arrangements for warming and ventilating buildings.*" Patent dated Sept. 25, 1867.

This invention, under one head, has reference to improvements applicable to stoves of the character of Gurney's stoves, or any stove having a number of plates from its outer surface, with the plates vertical in a trough of water, or any stove of analogous construction or action, and consists in constructing the said stoves with feeding-door, fire-door, and ash-pit door, so arranged that they shall open into a stoking chamber or compartment, which is otherwise entirely separated from the stove, such stoking chamber or compartment being wholly separated from the building to be warmed and ventilated.

2716.—GEORGE WILKINSON, of St. Leonard's Road, Bromley, in the co. of Middlesex, for "*Improvements in pumps.*" Patent dated Sept. 26, 1867.

According to these improvements the suction-pipe of the pump is arranged to rise up at the side of the pump-cylinder in a chamber provided for it. The cylinder communicates at its lower end with this chamber, and the cylinder contains a valved piston or bucket having a short and rapid stroke given to it usually by a crank and multiplying gear. The suction-valve is mounted on the top of the suction-pipe at a level above the piston or bucket, so that this is necessarily at all times immersed in the water. The water is delivered through the piston or bucket passing the clack or valve therein, and it escapes by a spout or delivery-pipe at the upper end of the cylinder above the piston or bucket.

2718.—JOHN BRUNTON, of 37, Kensington Park Gardens, Notting Hill, in the co. of Middlesex, for "*Improvements in machinery for raising water.*" A communication. Provisional protection only obtained, dated Sept. 26, 1867.

According to this invention two discs are mounted horizontally in suitable bearings, and driven by a bullock-mill, or in other convenient manner, at a distance apart and connected the one with the other by bars parallel to the axis, and equidistant from it and from each other. It is preferred to employ eight such bars, which, with the discs, form a skeleton drum of an octagon form. Over this drum two endless chains pass; they are made with links of iron plate corresponding in length to the sides of the octagon drum, and jointed the one to the other. The chains carry between them buckets which are riveted to them, every alternate link of each chain being riveted to the end of a bucket. The buckets are rectangular, of a depth of about equal to the length of the links from centre to centre, and somewhat less in width; they are riveted to the chains in an inclined position, so that, as each bucket ascends with the water which it has taken from the source, its inner side is higher than the outer. A trough is placed beneath the drum outside the chains on their descending side, and the buckets as they come round discharge the water into it. The apparatus should be driven at a speed which is just sufficient to cause each bucket as it comes round to discharge its water into the trough, throwing it outwards clear of the bucket beneath.

2749.—THOMAS WESTON, of Birmingham, in the co. of Warwick, tube maker, for "*An improvement or improvements in the manufacture of ornamental metallic tubes.*" Patent dated Sept. 30, 1867.

The invention consists in making ornamental tubes by coating or covering a tube or foundation of iron, or a tubular or solid core or foundation of steel, by a drawing process with a thin metallic tube, and passing the compound tube or tube and solid steel core or foundation through ornamental rolls, whereby the outer thin tube is ornamented or impressed with the pattern or ornament upon the said rolls.

2772.—CHARLES RITCHIE, of Brixton, in the co. of Surrey, gentleman, for "*Improvements in mechanism or arrangements applicable to steam-boilers and their furnaces, the said mechanism or arrangements being especially applicable to those boilers and their furnaces with which gas is the combustible used.*" Provisional protection only obtained. Dated Oct. 2, 1867.

This invention consists in the adoption in steam-boilers of arrangements of mechanism whereby a float or other equivalent contrivance may be used in connexion with a damper, or other such like appliance, in or appertaining to the flue or passage for carrying off the products of combustion and heated air, thus controlling the generation and pressure of steam, with suitable provision for regulating in an automatic manner the supply (of gas for boilers heated by gas), and of air and water to boilers heated by gas or other means.

2776.—FREDERICK JOHN JEFFERY, of the firm of J. and W. Jeffery and Co., of Liverpool, in the co. of Lancaster, general drapers and cabinet makers, for "*Improvements in urinals.*" Patent dated Oct. 2, 1867.

This invention consists, first, in supporting the urinal proper on or by hinges or trunnions, or their mechanical equivalents, so that it can be folded up when out of use, and made to lie flush with the wall, washstand, or other structure in which it is fitted, and practically be invisible, presenting only its side or back, which can be ornamented in any desired manner; secondly, in combining with urinals supported according to the first part of this invention a water-supply pipe with a valve or tap therein, so that the folding down into position for use shall open the valve or tap, and allow water to flow, and the folding up, close such flow; and, thirdly, in making urinals constructed according to the first or both the first and second parts of the invention self emptying and closing. For this purpose a receptacle is formed at the back of the urinal proper, into which the liquids flow. When these reach a certain weight, the projecting part is overbalanced, the contents discharged at the back, and the flow of water shut off.

2809.—LUKE WILLIAMS, of Fenchurch Street, in the City of London, for "*An improved combined lift and force-pump.*" A communication. Provisional protection only obtained. Dated Oct. 5, 1867.

The object of this invention is to enable an ordinary pump to throw a constant stream of water with only one foot-valve. To a suitable casing or valve-box containing the foot-valve of the pump, placed immediately over the suction-pipe, three barrels are connected, the area of the middle barrel being equal to the combined area of the two outer barrels. The middle barrel is fitted with a ram, and is fixed immediately over the foot-valve of the pumps; the other barrels are each fitted with a bucket, and the rods thereof, as also that of the ram, are connected by their upper ends to a cross-head, the ends whereof work in guides, and to this said cross-head a connecting-rod is attached, communicating with any suitable prime mover. The kind of valve proposed to be employed is an equilibrium valve, well known by miners as the Cornish valve.

Another important feature in this invention consists in adapting a hinged or sliding door to the valve-box, by which access can be readily had to the valve when necessary. The barrels containing the buckets are connected together by a branch pipe, so as to form one outlet for the flow of water. The ram and buckets move up and down together; the down-stroke of the ram forces the water through the buckets, and the up-stroke thereof forms a partial vacuum in the barrels, by which they are again filled with water at the same time the buckets are forcing the water out of their respective barrels, and by these means a continuous stream of water may be raised and thrown. Instead of three barrels, two only may be used, one fitted with a ram and the other with a bucket, the action being precisely the same—viz., to raise and throw a constant stream of water.

2811.—NATHANIEL FORTESCUE TAYLOR, of 8, Manby Street, Stratford, in the co. of Essex, gas engineer, for "*Improvements in means or apparatus to be used in impregnating air and aëriform fluids or gases with hydrocarbons, and in burners used in burning the inflammable air obtained, which burners are also applicable when burning other gaseous fluids.*" Patent dated Oct. 5, 1867.

Upon endless chains or bands having motion given to them by a pair of rollers, and supporting at short intervals apart pieces of perforated flannel, felt, or sponge, or other open work capable of holding hydrocarbon liquid in suspension, is caused to travel a tube, or endless and elongated chamber, in which the pieces of flannel or other open or porous matter act, somewhat as a series of pistons or buckets, to prevent as much as possible the passage of the air or other aëriform fluid to be impregnated except through the porous substance. The hydrocarbon liquid is supplied to the lower part of this tube or endless chamber from a suitable reservoir placed by the side of it through

a passage with a valve acted upon by a float into an attached chamber, which chamber communicates with the bottom of the tube or endless chamber by a tube or limb of the endless tube or chamber, up which it is caused to flow to the top, and then down the opposite side or limb thereof, and out at the lower part of such side or limb. The upper part of the endless tube or chamber is in communication with the upper part of the reservoir of the hydrocarbon, so as to equalize the pressure thereof. There is also an air passage from the float-chamber to the upper part of the reservoir. The air or aëriform fluid to be impregnated is forced through the apparatus by bellows placed in a chamber where the moveable head or heads of the bellows act as a piston or pistons with sliding-valve passages operated from a shaft worked by a spring or weight and suitable gear. By these means the atmospheric air surrounds all parts of the endless chamber.

2823.—RICHARD GARRATT, of Sheffield, in the co. of York, plumber and gas-fitter, for "*An improvement in ball and other cocks.*" Provisional protection only obtained. Dated Oct. 8, 1867.

This invention consists of an improvement in the construction of ball and other water-cocks, which is particularly applicable where the supply is at a high pressure. The end of the supply-pipe is turned upwards, and in it is mounted a central spindle capable of sliding up and down. On this spindle is fixed an inverted cup of lead or other metal, inside which is a disc of india-rubber, forming a water-tight valve, which, when the spindle is pressed down, effectually closes the orifice of the supply-pipe and shuts off the flow of water. The body of the cock which encloses this valve may be of a globular or other convenient form, having an opening below for the escape of the water, and another at the top through which the upper part of the valve-spindle works. This valve-spindle is connected to the ordinary lever and ball when a self-acting arrangement is required, and if otherwise the spindle is provided with a screw-thread working in a screw formed in the opening through which it passes out, and the valve is opened or closed by turning the spindle round by means of a key or otherwise.

2840.—WILLIAM POTTS, of Handsworth, in the co. of Stafford, manufacturer, for "*Improvements in gaseliers.*" Patent dated Oct. 9, 1867.

This invention has for its object the suspending of the ordinary gaselier (which generally has the moveable or sliding part supported by chains and balance-weights) by so constructing the gaselier that the rising and falling is produced without the risk of accident from the breaking of the balance-chains to which the ordinary gaseliers are liable. Gaseliers constructed according to this invention do not require the water-cup which is the source of frequent accidents in ordinary gaseliers. In making a gaselier according to this invention the fixed pipe or tube for conveying the gas to the gaselier is connected to the ceiling of the room by a ball-and-socket joint, which is provided with stop-pins for the purpose hereinafter explained. At the bottom of the pipe is a stuffing-box, to which the stationary outer casing of the gaselier is fixed, and on the bottom of the said casing is a screw-box or collar. In the interior of the moveable part or body of the gaselier carrying the arms or branches is a quick-threaded screw which is capable of working through the fixed screw-box or collar. This screw is hollow or tubular, and has connected to its upper end a small pipe which works through the stuffing-box. The base of the screw has fixed in it the plug on which the gas-box or chamber works, and the said plug is ground air-tight into the gas-chamber. A series of holes is made in the plug through which the gas passes to the chamber, and from the said chamber to the pipes passing through the arms of the gaselier. On the lower part of the plug on which the gas-chamber and parts connected therewith are supported are fixed a washer and screwed collar. By the arrangement of the parts it will be seen that the gas entering the pipe by the ball-and-socket joint, passes down the small pipe and hollow screw and plug to the gas-chamber, and from thence, by the pipes, to the branches or arms of the gaselier. By means of the stuffing-box the escape of gas between the pipes is prevented, and by means of the ground-plug the escape of gas on its passing from the hollow screw to the gas-chamber is prevented. At the bottom of the ornamental body, and fixed to the bottom of the plug of the gas-chamber, is an ornamental termination or handle to be used for raising or lowering the sliding part of the gaselier. When it is wished to raise the moveable body of the gaselier, a rotatory motion in a direction proper to make the screw advance in the screw-box is given to the terminal ornament or knob, either by the direct application of the hand thereto, or by the insertion of a cranked lever in a hole in the said ornament or knob. By giving motion to the said ornament or knob with one hand and holding one of the branches by means of the other hand the hollow screw is raised through the screw-box or collar, and with it the moveable lower part of the gaselier, the moveable part of the said gaselier sliding over the outer casing. As the screw rises the small pipe also rises through the stuffing-box. By giving the terminal ornament or knob a rotatory motion in the contrary direction the screw descends in the screw-box, the pipe descends in the stuffing-box, and the moveable parts of the gaselier are lowered.

2847.—RICHARD BROTHERTON, of Wolverhampton, in the co. of Stafford, wrought-iron tube maker, and JOSEPH WALDRON, of Wolverhampton aforesaid, wrought-iron tube maker, for "*Improvements in the manufacture of lamp-posts.*" Patent dated Oct. 10, 1867.

This invention consists in making lamp-posts of wrought iron or partly of wrought iron and partly of cast iron, substantially in the manner hereinafter explained, by which method of manufacture lamp-posts are produced lighter and stronger than ordinary lamp-posts, and free from the liability to fracture common to ordinary lamp-posts. In making lamp-posts according to this invention tubing of wrought iron, either of a cylindrical figure or of a taper figure, is employed. When taper tubing is employed, a portion of the tube at its widest end is made cylindrical, for the purpose of forming a screw on the top and outside of the tube, the lamp-iron for the reception of the lamp being fixed on the said screwed top of the tube. The cross-bar is made of two pieces of tubing screwed at opposite points and at the required height into the principal tube or post. The skeleton frame of the lamp-post, or the part buried in the earth, is made either of wrought iron or of cast iron. When made of wrought iron the base of the principal tube or post is fixed therein by screwing. When made of cast iron it is preferred to fix the principal tube therein by casting the said frame on the end of the tube, or the principal tube may in this case be fixed in the frame by screwing.

2853.—RICHARD GEORGE, of Kilburn, in the co. of Middlesex, for "*Improvements in apparatus for warming and ventilating apartments or buildings.*" Patent dated Oct. 11, 1867.

This invention consists in forming a portable heating and ventilating apparatus with a chamber of thin sheet iron enclosing a grate or fireplace, the chamber being of such dimensions that the products of combustion will circulate within it for a sufficient time to part with a large proportion of their heat, and in arranging within such chamber a pipe or other contrivance of thin sheet iron, through which a current of air passes from the exterior to the interior of the chamber or building to be warmed or ventilated; and further, in so arranging the chamber or case and the pipe or contrivance through which the air is admitted that the burning fuel does not come in contact with them, but only the heated products of combustion arising from the combustion of such fuel.

2854.—JOHN WITHINSHAW, of Birmingham, in the co. of Warwick, mechanical engineer, and JOHN EDWARD BAKER, of Birmingham aforesaid, mechanical engineer, for "*Improvements in the means or machinery for working or actuating the slide-valves of steam-pumps and blowing-engines.*" Patent dated Oct. 11, 1867.

This invention consists of the improvements in the means or machinery hereinafter described for working or actuating the slide-valves of steam-pumps and blowing-engines, whereby economy of construction and simplicity of the parts are secured, combined with efficiency of action. Slide-valves of steam-pumps and blowing-engines are ordinarily worked or actuated by an eccentric on a rotating shaft. This invention consists in working or actuating the said slide-valves by means of a lever worked from the piston-rod of the pump or blowing-engine. When the invention is employed in connexion with a double-acting steam pump, a lever is placed between the steam and pump cylinders, the said lever being of such a length that the ends respectively of its arms are in a line with the piston-rod and slide-valve rod of the pump. On the piston-rod of the pump two collars are fixed, the distance between the said collars nearly corresponding to the length of the stroke of the pump, and on the slide-valve rod two collars are also fixed. The end of the slide-valve rod in advance of the collars described works in a guide. The end of the long arm of the lever works between the collars on the slide-valve rod, the said collars embracing the said arm, and the end of the other and short arm of the lever is so situated that on the pump-piston making its reciprocating motion the said arm is alternately struck by one or other of the collars on the piston-rod. By the striking of the collars on the piston-rod against the short arm of the lever the said lever is turned on its centre, and the opposite arm embraced by the collars on the slide-valve rod is made at the proper times to work the said slide-valve rod, and thereby actuate the slide-valve. The position of the lever and the arrangement for working the said lever from the piston-rod may be varied, without departing from the nature of the invention.

2859.—JULIUS BRÖNNER, of Frankfort-on-the-Maine, in the kingdom of Prussia, manufacturer, for "*An improvement in the construction of gas-burners.*" Patent dated Oct. 11, 1867.

This invention relates to the construction of gas-burners having any application by which the entrance of the gas into the burner is regulated, and has reference to a former patent, dated Oct. 17, 1867 (No. 2679). To the lower-hole burner, instead of only two orifices, is given, say, three, four, five, six, or more, which are distributed round the centre, whereby the gas is spread more completely than by two holes only, and it is forced to enter more equally and more regularly into the hollow body of the burner. This object is more perfectly attained by piercing the holes in an inclined direction, and by giving a concavo-convex form to the piece which is inserted in the burner and contains the holes. The larger the intended consumption of the burner the greater will be the number of orifices.

2870.—ROBERT FLAMWELL BARÉ and JOHN THOMSON, both of the city of Glasgow, in the county of Lanark, North Britain, merchants, for "*Improvements in the conduction or transmission of fluids, and in the means, apparatus, or mechanism employed therefor.*" Patent dated Oct. 12, 1867.

The most essential feature of this invention consists in the introduction or use of a valve and valve-seat or chamber having a screw or other equivalent coupling, recess, or projection formed at its outer end or extremity for attaching the tap or other conduit for drawing off the fluid, where it is firmly screwed or otherwise secured fluid and pressure tight by the action of a spring, weight, incline, or screw action, or by the weight or buoyancy of the valve itself, or by the pressure within the vessel.

APPLICATIONS FOR LETTERS PATENT.

2255.—ALEXANDER BROWNE, of the firm of Browne and Co., patent agents, of 49, King William Street, in the City of London, for "*Improvements in liquid-meters.*" A communication. July 17, 1868.

2258.—ROBERT MELDRUM, of Pittormie, Cupar, in the co. of Fife, N.B., for "*Improvements in machinery or apparatus for raising and discharging fluids.*" July 17, 1868.

2261.—DANIEL WEBSTER, of Southport Gas-Works, in the co. of Lancaster, for "*Certain improvements in the manufacture of gas, and in apparatus connected therewith.*" July 18, 1868.

2266.—William Berry, of 10, Kingsland Green, in the co. of Middlesex, for "*Improvements in the means or apparatus for lighting shops, rooms, and other places from the outside of the building, by gas, oil, or other illuminating materials.*" July 18, 1868.

2267.—Frederic Chomé-Steinbach, of Brussels, in the kingdom of Belgium, for "*An improved joint for metallic pipes for conveying fluids and liquids.*" July 18, 1868.

2283.—Alfred Homfray, of Witley Lodge, Halesowen, in the co. of Worcester, gentleman, for "*Improvements in separating coal, cokes, and breezes from bats and other impurities, and in machinery or apparatus to be employed for that purpose, which improvements and machinery or apparatus may be applied to the separation of various substances.*" July 20, 1868.

2292.—Alexander Melville Clark, of 53, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in apparatus for feeding steam-boilers and liquid or fluid reservoirs, partly applicable to pumps.*" A communication. July 21, 1868.

2295.—Charles William Bradshaw, of Stubbington, in the co. of Hants, for "*Improvements in coupling hose for steam and fire engines, gas and water pipes, hydrants, and other similar purposes.*" July 22, 1868.

2300.—Charles Forster Waldo, of 13, Bread Street, Cheapside, in the City of London, merchant, for "*Raising or moving water or other fluid.*" A communication. July 22, 1868.

2322.—Joseph Sykes Bromhead, of Victoria Road, and 32, South Grove, Peckham, in the co. of Surrey, and Joseph Whitmee, of St. John Street, Clerkenwell, in the co. of Middlesex, engineers, for "*Improvements in dry gas-regulators.*" July 23, 1868.

2323.—Auguste Bockholtz, of the city of Vienna, in the empire of Austria, Inspector-General of Railways, for "*Improvements in self-acting valves by the use of compressed air.*" July 24, 1868.

2328.—George Smith, of Camberwell New Road, in the co. of Surrey, civil engineer, for "*Improvements in machinery for obtaining rotary motion, and for raising, forcing, and measuring fluids.*" July 24, 1868.

2364.—James Webster, of Birmingham, in the co. of Warwick, engineer, for "*Improvements in the manufacture of gas and vapour, and in applying such gas and vapour in manufacturing and refining iron and other metals, and in recovering certain products therefrom.*" July 28, 1868.

2395.—John Henry Johnson, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*An improved flame-spreader and aërator for gas and other burners.*" A communication. July 30, 1868.

2398.—John Gwynne and Henry Anderson Gwynne, of the Hammersmith Iron-Works, Hammersmith, in the co. of Middlesex, engineers, for "*Improvements in the construction of and mode of employing and driving centrifugal pumps and pumping-engines, and in surface condensers to be employed in conjunction therewith, parts of which improvements are applicable to other purposes.*" July 30, 1868.

GRANTS OF PROVISIONAL PROTECTION.

2079.—Samuel Hannah, of Haughton-le-Skerne, near Darlington, in the co. of Durham, engineer, for "*Certain improvements in fluid-meters.*" June 29, 1868.

2103.—William Brookes, of 62, Chancery Lane, in the co. of Middlesex, civil engineer and patent agent, for "*Improvements in meters for measuring water and other liquids.*" A communication. July 1, 1868.

2136.—Andrew M'Niel, of Tiverton, in the co. of Devon, engineer, and William Wheaton, of Exeter, in the same co., merchant, for "*An improved process for the manufacture of salts of ammonia from ammoniacal gas liquor.*" July 4, 1868.

2149.—James Thomson, of Peckham, in the co. of Surrey, for "*Improvements in chimney-tops and ventilators.*" July 7, 1868.

2159.—Thomas Jefferson Mayall, of Roxbury, Massachusetts, U.S.A., now of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, for "*Improvements in the manufacture of gas-tubing and other articles of india-rubber.*" July 8, 1868.

2174.—James Chandler, of 17, Cottage Grove, Mile End Road, in the co. of Middlesex, for "*Improvements in apparatus for drawing and preventing waste of water from pipes, mains, or other sources for domestic or other purposes.*" July 9, 1868.

2195.—James Syson Nibbs, of Birmingham, in the co. of Warwick, lamp manufacturer, for "*Improvements in portable and other pumps and water-engines.*" July 11, 1868.

2232.—John Henry Johnson, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in lamps.*" A communication. July 15, 1868.

NOTICES TO PROCEED.

674.—James George Stidder, of Hanover Street, Long Acre, in the co. of Middlesex, engineer, for "*Improvements in water-closets, lavatories, and urinals, and in regulating supplies for same by water-valves.*" Feb. 28, 1868.

810.—Augustus Fraser Baird, of Pimlico, in the co. of Middlesex, lieutenant-colonel in the Bengal Staff Corps, for "*Improvements in earth-closets, applicable also to urinals.*" March 9, 1868.

839.—Samuel Naylor, of Ravensfleet, in the parish of East Stockwith, in the co. of Lincoln, engineer to the Morton Carr Drainage Proprietors, for "*Improvements in apparatus for raising water.*" March 11, 1868.

883.—Thomas Spring Lake Beech, of Charlton, in the co. of Kent, for "*Improvements in engines for obtaining rotary motion by means of steam, water, gas, or other fluids.*" March 16, 1868.

899.—William Hulse and Edwin Williams, both of Birmingham, in the co. of Warwick, manufacturers, for "*Improvements in the manufacture and ornamentation of metallic bedsteads and other articles of metallic furniture, a part of which improvements may also be applied to the ornamentation of metallic tubes and other metallic articles.*" March 17, 1868.

934.—Ellis Rowland, of Manchester, in the co. of Lancaster, engineer, and John Dalton, of the same place, gentleman, for "*Certain improvements in the method and arrangement of apparatus for closing dampers, which apparatus may also be employed for measuring liquids.*" March 19, 1868.

976.—Julius Brönner, of Frankfort-on-the-Maine, in the kingdom of Prussia, manufacturer, for "*Improvements in the construction of gas-burners.*" March 22, 1868.

1033.—Henry Davey, of 9, Victoria Chambers, in the city of Westminster, engineer, for "*Improvements in steam-engines, part of which is applicable to steam-pumps.*" March 26, 1868.

1046.—Stephen Holman, of 10, Laurence Pountney Lane, in the City of London, engineer, for "*Improvements in the construction and application of steam-pumps, parts of which improvements are also applicable to other pumps, blast-engines, exhausters, and other machines; also improvements in hydraulic lifts and the mode of working the same.*" March 27, 1868.

1082.—Andrew Barclay Walker, of Warrington, in the co. of Lancaster, brewer, for "*Improvements in the application of hot blast or heated air for evaporating salt brine and other liquids, sugar, or chemicals; also for heating gas and oil retorts, raising steam in boilers, boiling worts in breweries and distilleries, which improvements are also applicable for bleaching, tanning, and baking; likewise improvements in apparatus used in some of the aforesaid applications.*" March 30, 1868.

1097.—Thomas Couldrey, jun., of Kirkdale, near Liverpool, in the co. of Lancaster, for "*Improvements in pumps for ships and other purposes, and in the construction of buckets or valves for the same.*" April 1, 1868.

1164.—Emile Watteeu, of Vulcan Works, Middlesborough-on-Tees, in the co. of York, for "*Improvements in screw-taps and in the mode of fixing the same.*" April 7, 1868.

1334.—Charles Brown Hardick and John Hardick, of Brooklyn, in the state of New York, U.S.A., for "*Improvements in direct-acting engines and pumps.*" April 23, 1868.

PATENT WHICH HAS BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1864.—Richard Archibald Brooman, "*Improvements in pumps.*" July 17, 1865.

PATENT WHICH HAS BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

1840.—William Edward Newton, "*Improvements in engines for obtaining motive-power by an explosive mixture of inflammable gases and air.*" July 22, 1861.

Parliamentary Intelligence.

HOUSE OF COMMONS.

WINDSOR AND ETON WATER-WORKS BILL.

THURSDAY, MAY 14.

Mr. Denison, Q.C., and Mr. Richards, Q.C., were counsel for the promoters; and Mr. Will represented the Windsor Corporation, who opposed.

The preamble of the bill, as it originally stood, stated that Windsor and Eton and part of Clewer had been supplied for upwards of a century and a half with water by means of water-works situate at Eton, of which William Henry Cutler was tenant for life, but which works were vested in Edward Cutler the younger, Alfred Beverley Collard, and Alfred Swaine Taylor, as the trustees of the settlement made on the 13th of October, 1856, upon the marriage of Mr. Cutler with Emily Taylor, his present wife, and as representing the persons beneficially interested under the same settlement; that the value of the works was estimated at £40,000, and that that value would be ensured, and the works more effectually carried on, were they vested in a company to be formed of Mr. Cutler and others, who were willing to do so. It was therefore expedient that power should be given to them for so doing.

Mr. Will said that before the committee proceeded, he had an objection to make with respect to their jurisdiction. He submitted that this was an estate bill, and as such it ought to have been introduced into the House of Lords in the first instance, where certain consents would have to be proved. The bill was one that proposed to extend the powers of certain persons who owned the works; it was not a public bill, or one in which the public had any voice whatever. It was entirely a bill for the convenience and arrangement of a family party, and therefore he held that the committee had no jurisdiction with regard to it.

Mr. Denison said that he had two or three answers to the objection raised by Mr. Will. The petition was silent with respect to the bill being a private one.

Mr. Will: At the time when it was drawn up it was proposed to make the bill a public one.

Mr. Denison argued that in its original state Lord Redesdale, he believed, did say that it was an estate bill, and he refused to let it go on; but it had been altered into its present shape in order to meet the difficulty which his lordship then raised. Secondly, he contended that if it was an estate bill, there was no order requiring that it should be introduced into the House of Lords first; thirdly, that as it had been referred to the committee by the House, it must be taken that it was duly referred; and, fourthly, that the objection now taken was not raised in the petition.

The Committee waived the objection.

Mr. Denison then stated the case for the promoters. First of all he would inform the committee, as his friend had raised an objection, why the bill had been altered into its present form. It was originally intended to transfer the works from the family of a gentleman named Cutler, who was the tenant for life, into the possession of a company, which was to be formed for the purpose of carrying on the undertaking as usual. The bill as now introduced was for incorporating and granting powers to the proprietors, so as to enable them to continue to supply the towns of Eton and Windsor with water. He found that the gentleman named in the preamble, and his predecessors, had been in the habit of supplying water to those towns for upwards of a century and a half, and he (Mr. Denison) well remembered drinking it when a boy at college. It was obtained from wells sunk by the

side of the Thames, and was of excellent quality—far better even than that which was obtained for the London supply, notwithstanding the stringent regulations embodied in the Conservancy Acts of the last two sessions. The water then was purer and better than they were in the habit of drinking in London, with all the purification which the supply from the Thames underwent. It had been supplied, as he said, for upwards of 150 years by Mr. Cutler and his predecessors under a sort of arrangement between them and the authorities of the town, and they had been allowed to break up the streets and do all the work requisite for giving a supply, and no complaints, as far as they were aware, had been made by their opponents, the Windsor Corporation, who now petitioned against the bill. Mr. Cutler, however, felt his position an insecure one. He had been sinking his capital in the works year after year for the purpose of improving them, and he could not refrain from seeing that there was a risk in his doing so after all, for the corporation might turn round upon him at any moment, pick up a quarrel, and prevent him from breaking up the streets, so that he was not only entirely at their mercy, but at that also of any private individual. He felt the necessity, therefore, of coming to Parliament, and asking for protection and for increased powers, so as to benefit his position. The simple object of the bill was to give Mr. Cutler a parliamentary *status* for his works, and a security against the risk which at present surrounded him. He was subject to an indictment even at the hands of any private individual, for it was a settled point of law that even the authorities of a town could not give permission to a person to break up the streets, providing such breaking up could be proved to be a nuisance. This was decided in the case of the Sheffield Water-Works some years ago, so that unless Mr. Cutler got the sanction of the Legislature he would still be at the mercy of any individual who might have a private pique against him. This, then, was the position of Mr. Cutler with reference to supplying water to these two important towns. In fact, there might be an absolute stoppage of the supply, and the inhabitants would then have to wait until some bill was introduced, by which a company might be formed to give it. It was reasonable, therefore, for Mr. Cutler to seek to obtain parliamentary protection, and whilst he did so he felt it to be incumbent upon him to give a proper supply to the town, and, in order to do this, he proposed to incorporate the provisions of the General Water-Works Clauses Act, and to fulfil other obligations which he believed would be for the benefit of the inhabitants. The petitioners said this—"It is proposed that the company to be incorporated by the said bill shall, at the request of the owner or occupier of any private dwelling-house, or part of a private dwelling-house, in any street in which any water-pipe of the company shall be laid, or on the application of any person who, under the provisions of that Act or any Act incorporated therewith, shall be entitled to demand a supply of water for domestic purposes to such private dwelling-house, or part of a private dwelling-house (which term 'domestic purposes' shall include a supply of water to one water-closet, but not to a bath), furnish to such owner or occupier or other person a sufficient supply of water for domestic purposes at yearly rates, as regards New Windsor and Clewer, not exceeding £4 10s. per cent. on the gross yearly value of such dwelling-house or part of a dwelling-house. Provided always, that the company shall not be obliged to furnish any such supply for any less sum than 2d. per week for any water-closet beyond the first, and for any private bath in any private dwelling-house, or part of such dwelling-house, or appurtenant thereto, there shall be paid, in addition to the before-mentioned rates (but subject, nevertheless, to the proviso next thereinafter contained), the following rates—that is to say, for every water-closet beyond the first, any sum not exceeding 10s. per annum; for every private bath, any sum not exceeding 20s. per annum. Your petitioners consider such proposed rates and charges to be excessive, and that the charge for supply of water for domestic purposes should in no case exceed the rate of £2 10s. per annum, calculated on the rateable value of the premises as assessed to the poor, and that in such charge two water-closets should be included, and that each water-closet beyond two should be charged 10s. per annum, and that the charge for each private bath should be 10s." Now, this was what the petitioners said, and, in point of fact, this was the substance of their complaint, and there was no opposition on the preamble of the bill. Mr. Cutler felt that he could not, in justice to himself, charge rates so low as those stated by the petitioners, but he proposed to charge as moderately as possible, and prices which would be much below the rates of a great number of water-works companies, from whom returns had been obtained. He had a list showing the rates charged in 50 towns of a size comparative with Windsor, and he found that Mr. Cutler proposed charging much below the majority of them. In a very few cases only were the rates lower. The list was rather too long to go through, but he would take the lowest domestic rates per cent. charged on the gross rental. They were as follows:—5, 6, 7½, 6, 6, 6, 5½, 5, 6, 6, 4 (a place in Wales), 5, 8, 7½, 6, 6, 7, 7, 5, 6, 5, 6, 7, 4 (Ipswich), 5, 4 (Kendal), 5, 5, 7, 5, 4 (Northampton—average, 5½), 6, 6, 6, 5, 3⅜ (Sheffield), 5, 5½, 5, 6½, 3 (Stockton, Middlesboro'), 6, 7½, 7, 6, 5, 6, 5, 6, and 6. Brighton was low in charge; Bristol had a high rate and a low one, but the average appeared to be about 4½; Cambridge also had two rates, one of them being very low. In Canterbury the average was about 4½; Kent, 5½; Leicester, 4½; and Norwich, 4½. Of course this was a question of more or less money, and whether it would pay Mr. Cutler to keep the town supplied constantly or intermittently. The petitioners stated in their next clause—"That it is proposed by the said bill (clause 35) that the water to be supplied by the said company need not be constantly laid on under pressure. Your petitioners consider that it is of the utmost importance that provision should be made for ensuring a continuous supply of water in the mains throughout the borough and district of your petitioners, and that at high pressure." Upon this point he (the learned counsel) had a little information to give. It seemed that a continuous supply could not be rendered under a yearly cost of £500, and if that was to be deducted from £1800, which was the net income derivable by Mr. Cutler from the works, it was reasonable to suppose that the rates ought to be raised accordingly. He proposed, however, even with that additional charge, to give to the town a supply of water at a less cost than they had at present. As to giving a constant supply, he need not remind the committee that it had been proved over and over again that the waste in a constant supply, except it was placed under a system of private supervision, was enormous, and would ruin any company of moderate dimensions. He would bring the committee back to the question which by the bill was placed before them. It was a question partly of money, as he had said, and partly of power. Mr. Cutler had no power to supply the town constantly, and did not propose to get it by this bill; but if the committee were disposed to direct that it should be given, then he asked that the rates now charged might be increased in order to meet the loss which would accrue. A mere dribble from a tap would amount to almost thousands of gallons in a day, so that it was almost impossible to give a constant supply unless the taps and other apparatus of the consumers were made secure, and all sorts of things were done to prevent the great waste that always, under a continuous supply, arose. Though provisions were introduced into the Acts of all the London companies, compelling them to give a constant supply if a certain portion of a district required it, yet it was always accompanied with the stipulation that the consumers should provide good and sufficient apparatus to prevent the water from running to waste. The next paragraph in the petition was the 6th—"That in the said bill no provision is made with respect to the supply of or rate to be charged for water for the various public purposes which are contemplated by the Public Health Acts and Local Government Act, and other like public Acts, under which your petitioners, acting by the council of the said borough as a Local Board of Health as aforesaid, have powers; and, particularly, no provision is made by the bill in regard to the supply of or rate to be charged for water required by such board for the purpose of flushing and cleansing sewers—a purpose for which large quantities of water will be required; and your petitioners consider that provisions of such kind should be made in the said bill, and that the charge for water supplied for such purposes should be fixed at the maximum rate of 6d. for every 1000 gallons." To meet this, Mr. Cutler had had a special manuscript clause drawn up, called 30A, by which he proposed that the undertakers should supply water by meter for flushing purposes at a rate not exceeding 6d. per 1000 gallons, the rate generally charged being 9d. The next paragraph was—"That it is proposed by the said bill (clause 36) that the company to be incorporated thereby may supply any person with water for any purpose, in respect of which no special rates are by the said bill granted, for such remuneration and upon such terms and conditions as shall be agreed upon between the company and the person desiring such supply; and your petitioners submit that the maximum charge at which such persons should be supplied by the said company should be fixed by the said bill, at the rate before mentioned—namely, 6d. per 1000 gallons—and that such persons may be allowed to provide their own meters." This was entirely a voluntary clause, and was meant to include cases that might not be included in the bill, and by which persons might be enabled to make their own agreement with the company. The petition then proceeded to state that the works were defective in an engineering point of view, and were inefficient to secure water supply to the borough and district in sufficient quantity and of sufficient quality, and so on, and thus had read through the principal clauses of the petition against the bill. He was not going into the engineering question at all; he had no means of knowing whether the works were actually defective or not; but this he knew, that there were two petitions in favour of the bill, one of them being from Eton, and which contained names of gentlemen of the highest respectability, and the other petition was from Windsor, and was very numerously signed. Both petitions showed that the inhabitants were well satisfied with the supply as it was at present provided by Mr. Cutler, and that they did not want the works to be taken by the corporation as proposed. In 1864 he believed that the corporation had some idea of buying the works, and then they did all they could do to depreciate them, as was the manner with most corporations when they had their own ends to serve. They even advertised in the local newspapers for complaints against Mr. Cutler, but what the result of that was he (Mr. Cutler) never heard; but, at all events, no information of any complaints ever came to his knowledge, and Mr. Cleeve, his collector, heard of no complaints, as far as he (Mr. Cutler) knew. He was not then employed as the collector. (A voice: "No.") He heard an emphatic "No," and he expected it. There were reasons why he should not be so any longer. He was now an officer of the corporation, and he had a brother in the corporation, and he hoped to see both those gentlemen examined. There was another proceeding on the part of the corporation about which he had to speak. When the bill had been introduced, and after their petition had been presented against it, complaining of engineering defects, they actually had the coolness, on the 18th of April, to begin a correspondence complaining that their engineer had been refused admission into the works, and demanding that he should be admitted, to fish, as it were, for objections against the bill by personally examining the works; and they seemed to be rather surprised that their officer was not welcomed at the works as he ought to have been. At all events, Mr. Cutler refused to admit him, and he could not help thinking that it would have been extremely unwise on his part if he had done so. Had he been admitted, then the corporation would have justified their allegations by saying that the works were overvalued, or were defective, as proved by their engineer, who had personally examined them. They had heard a good deal about the opposition to gas companies in London, but even the Metropolitan Board had not asked for such a thing. In conclusion, Mr. Denison asked the committee to pass the bill, when the inhabitants of Windsor, Eton, and Clewer, he said, would continue to be supplied with pure water at a moderate rate.

The following evidence in support of the bill was then taken:—

W. H. Cutler, Esq., examined by Mr. RICHARDS.

I live at Salt Hill House, near Slough, and am tenant for life of the water-works at Eton, by which that town, and the borough of Windsor, and part of Clewer, have been for many years supplied. I have the deeds in my possession, and can say, from an inspection of them, that I and my predecessors have supplied the district for now a century and a half. The water that we supply is, I believe, excellent in quality and abundant in quantity. I have expended considerable sums of money upon the works, in improving them for the benefit of the district, and I may say that, since I have had the management of them, during the last twelve years, I have laid out between £15,000 and £16,000. The supply is derived from wells. Under this bill I propose to charge a certain rate—viz., 4½ per cent. for Windsor and Clewer, and 3½ per cent. for Eton. It is a low per centage for the latter.

The CHAIRMAN: Is that on the rateable value?

Witness: It is on the gross value, according to the Water-Works Clauses Act.

Mr. RICHARDS: Are those rates higher or lower than you actually charge now in the case of Windsor?

Witness: It is as nearly as possible the same thing. A circular was sent round to the inhabitants in 1851, fixing the rate at 5 per cent., and all closets were chargeable. By this bill it is reduced to 4½ per cent., and the first closet does not pay anything. This, of course, considerably reduces the rate, as every house has a closet, which will not now be chargeable. I should be a great loser except for the new assessment, which will soon be in force. I have written to about 200 secretaries of different companies or local authorities who supply the water, and I find, from the answers I have received, that the rates I propose to charge are considerably lower than most of them. In one or two instances they are lower than ours, but they are exceptional cases. I may name Brighton, for instance, which has a lower charge, and is about equal to what I propose for Eton. That is an exceptional town; it has upwards of 100,000 inhabitants, and the houses are high-rented. I could mention several towns where the rate is 7 per cent., and the supply in the hands of either a corporation or commissioners. I find from reference to Acts that have been passed recently that the charge allowed by Parliament to a water-works company is from 5 to 6 per cent. for an intermittent supply, and from 7½ to 6 per cent., according to the rent, for a constant supply; and when it is a constant supply I think in every case the supply is limited to the pressure which can be afforded from the reservoirs of the company. I have

also made inquiries from different towns, and have prepared a table showing the results, as follows:—

ANNUAL CHARGES OF WATER-WORKS COMPANIES, 1868.

Taken from recent Acts of Parliament.

Town Supplied.	Population.	Domestic Rate. Highest per cent.	Domestic Rate. Lowest on gross rent.	Charge for Water-Closets. 1st.	Charge for Water-Closets. Others.	Baths.	By Meter. Per 1000 Gallons.	Constant or not.
Abertillery and Aberstruth ...	...	6	5	..	5/0	12/0	..	No
Aldershot	8,000	7½	6	..	10/0 to 5/0	12/0 to 8/0	1/6 to 1/0	Yes
Aylesbury	26,000	7½	7¼	10/0	5/0	20/0	2/6—1/6	Yes
Blackburn.....	73,000	6	6	6/0	6/0	..	1/0—0/6	No
Birmingham ...	380,000	10	6	..	4/0	..	1/0—0/6	
Bodmin	...	7	6	..	5/0	10/0	By agreement	Yes
Bromsgrove, &c.	...	7½	5½	..	5/0	10/0	..	Yes
Calverley Distct.	...	8	5	10/0	10/0	10/0	1/6—0/9	Yes
Canterbury	21,500	7	8	..	10/0—6/0	10/0—6/0	..	Yes
Camborne	...	7	6	..	5/0	10/0	..	Yes
Cefn, &c.....	...	6	4	..	5/0	8/0	..	No
Chester	31,000	7½	5	..	10/0—3/0	15/0—5/0	1/0—0/8	No
Claycross, &c..	...	12	8	..	5/0	5/0		
Chiltern Hills ..	...	7½	7½	10/0	5/0	20/0	2/6—1/6	Yes
Eastbourne.....	6,000	7½	6					
Ebbw Vale, &c..	...	7½	6	..	5/0	10/0	..	Yes
Fisherton Anger	...	7	7	..	5/0	10/0	..	No
Folkestone	10,000	8	7	10/0	10/0	10/0	..	No
Gravesend and Milton	30,000	7½	5	10/0	10/0	..	1/6—0/9	
Great Grimsby .	15,000	7½	6	..	5/0	10/0		
Hartlepool	40,000	7½	5	..	8/0	12/0—7/0	..	Yes
Herne Bay	..	7½	6	..	5/0	10/0	..	Yes
Holyhead	7,000	7	7	..	5/0	10/0		
Ipswich	38,000	6	4	..	5/0	10/0	1/3—0/10	No
Kilmarnock	23,000	5	5	..	By agreement	..	..	No
Kendal	12,000	7	4	10/0 to 8/0	5/0	..	1/0—0/6	
Lincoln	21,000	5	5	20/0—8/0	20/0—8/0	..	0/9	No
Lowestoft,G &W	15,000	6	5	12/0—7/0	5/0	12/0—5/0	1/0—0/8	No
Margate.....	10,000	7	7	..	14/0—6/0	14/0—6/0		
Mold, G & W...	4,000	6	5	..	6/0	12/0	..	No
Northampton...	34,000	6½	4	6/0	6/0	..	1/0	No
Paignton.....	...	7	6	..	5/0	10/0	..	No
Peterborough ..	15,000	7½	6	..	5/0	10/0	..	Yes
South Essex,1863	...	6	6	4/0	4/0	8/0	2/0—1/6	No
Sevenoaks.....	5,000	7½	5	8/0	8/0	8/0	3/0—1/0	Yes
Sheffield	230,000	8	3½	10/0—5/0	10/0—5/0	Meter.	0/10—0/6	Yes
Scarborough ...	19,000	5	5	10/0—5/0	10/0—5/0	10/0—5/0	2/0—1/0	No
Stockport Distct.	60,000	7½	5½	..	5/0	12/0	2/0—0/7	Yes
South Staffordshire, 1866 ...	...	6½	5	..	4/0	8/0	1/0—0/10	No
St. Albans.....	18,000	10	6½					
Stockton, Middlesborough ..	13,500	7½	3	10/0—4/0	10/0—4/0	10/0—4/0	1/6—0/6	
Slough	4,000	7½	6	..	5/0	10/0	..	Yes
Swindon	10,000	7½	7½	8/0—6/0	8/0—6/0	14/0—10/0	1/6	No
Whitby	12,000	7	7	..	5/0	10/0		
Wisbeach	10,000	7½	6	..	5/0	10/0		
Wakefield, 1862.	23,000	10	5	6/0	6/0	8/0	1/0—0/6	Yes
Warrington 1850	27,000	6	6	..	..	10/0	1/0—0/6	No
Weymouth.....	14,000	5	5	10/0—6/0	10/0—6/0	..	2/0—0/8	Yes
Wigton & other places, 1866 ..	...	6	6	..	5/0	10/0	..	No
Woodbury, Topsham, &c.,1868	...	7½	6	..	5/0	10/0	10/0—5/0	Yes

The rates allowed to water-works companies by Parliament (special Acts), in 1866 and 1867, were as follows:—1866: At Wigton and other places, not constant, domestic rate, 6 per cent.; closet, 5*s.*; and bath, 10*s.* Weardale and Shildon, not constant, 7½ per cent.; closets, 5*s.*; bath, 10*s.* Ventnor (gas and water), not constant, 10*d.* in the pound on rate; and this includes extra closet, 5*s.*; extra bath, 6*s.* The profits of the company are made by selling gas at 5*s.* 10*d.* per 1000 feet. Bridge of Allan, not constant, 5 per cent.; closets and baths by agreement. Bromsgrove, Droitwich, &c., not constant, constant pressure limited by pressure, 7½ to 5½ per cent.; closet, 5*s.*; bath, 10*s.* Cefn, Acrefair, and Rhosymedre, limited pressure from reservoir, 6 to 4 per cent.; closet, 5*s.* to 7*s.* 6*d.*; bath, 5*s.* to 8*s.* Canterbury (gas and water), limited pressure from reservoir, 7 to 6 per cent.; closet, 5*s.*; bath, 10*s.* Ebbw Vale, Beaufort, Sirhowy, Victoria, &c., limited pressure from reservoir, 7½ to 6 per cent.; closet, 5*s.*; bath, 10*s.* East Barnet (gas and water), not constant, 6 to 5 per cent.; closet, 5*s.*; and bath, 12*s.* The company charge 7*s.* per 1000 cubic feet for gas. Kilmarnoch, not constant, 5 per cent.; closets and baths by agreement. Holyhead, not constant, 7 per cent.; closet, 5*s.*; bath, 10*s.* Aldershot (gas and water), not constant, 7½ to 6 per cent.; closet, 5*s.*; bath, 10*s.* 1867: Peterborough, Kesteven, Maxey, Peakirk, Etton, Glinton, Werrington, Walton, Paston, New England, Dodsthorpe and Dogsthorpe, limited pressure from reservoir, constant, 7½ to 6 per cent.; closet, 5*s.*; bath, 10*s.* Hartlepool (gas and water), constant, from pressure, 7½ to 5 per cent.; closet, 8*s.*; bath, 7*s.* to 12*s.* Paignton, not constant, 7 to 6 per cent.; closet, 5*s.*; bath, 18*s.* Mold, not constant, 6 to 5 per cent.; closet, 6*s.*; bath, 12*s.* Bodmin, limited pressure from reservoir, 7 to 6 per cent.; closet, 5*s.*; bath, 10*s.* Herne Bay, constant from reservoir, 7½ to 6; closet, 5*s.*; bath, 10*s.* Fisherton Anger and Bemerton, not constant, 7 per cent.; closet, 5*s.*; bath, 10*s.* Crickhowell and vicinity, not constant, 10*d.* in the pound on rate; closet, 7*s.* 6*d.*; bath, 7*s.* 6*d.* Profit made by selling gas at 6*s.* per 1000 cubic feet. Camborne, Crowan, and Illogan, constant, from reservoir, 7 to 6 per cent.; closet, 5*s.*; bath, 10*s.* Abertillery and Aberystruth, not constant, 6 to 5 per cent.; closet, 5*s.*; bath, 10*s.*

Mr. RICHARDS: Have you ascertained what would be the cost of a constant supply to Windsor?

Witness: It would be something considerable, considering the size of the works. It would be at least £500 a year. It would involve an alteration of all the taps and the mode of supply. They would certainly have to be of the most approved construction—Lambert's or some kind of tap to stand the high pressure. The gross income derivable from the works at present is about £2800, and the net about £2000. If I were obligated to give a constant supply at an expense of £500 per annum, I should have, of course, to charge an increased rate. There are certain petitions in favour of the bill from the inhabitants of Windsor and Eton. There is one signed by almost all the principal persons residing in the latter town. Certain modifications have been made, and consequently I propose to charge for every water-closet beyond the first any sum not exceeding 5*s.*, instead of 10*s.*, and for every private bath any sum not exceeding 10*s.*, instead of £1, as it originally stood. I have also introduced a clause for supplying water for flushing the sewers at an exceedingly small rate. I introduced these modifications to satisfy the Local Board of Health of Windsor, and I understood they were approved of. I cannot see how they can be otherwise than satisfactory. I hardly ever get a complaint now. Whenever there is one, I always send to the house, and I generally find there is something the matter with the fittings. In 1864 the corporation of Windsor advertised in the local papers for people who had any complaints to make against the water supply, but I believe they got but a very scanty crop indeed. I inquired of my collector as to complaints, and I published a letter, in August of that year, addressed to the Local Board of Health, stating that a searching inquiry had been made from house to house by Mr. Cleave, my collector, for the purpose of testing the private supply, and that in the upper district, in which might be included Thames, Market, Church, St. Alban's, and Park Streets, comprising 179 connexions, there were only four cases of deficiency of water, resulting entirely from local causes—*i.e.*, from their taps. This district includes the two principal hotels, the Great Western Railway Station, and the gas-works. In the Sheet Street district, including Brook Street, Brunswick Terrace, Adelaide Square, Gloucester Place, Adelaide Terrace, Queen's Villas, the infantry barracks with over 700 men, Love Lane, and Victoria Street (number of connexions, 257), there had been five instances of deficient supply from the same causes. In the Peascod district, including the cavalry barracks, with 350 men and their horses, and 434 connexions, there was not one complaint; and at the extreme end of the borough some of the resident cowkeepers had had a gratuitous supply for their cattle, so that the number of connexions was 870, with only nine cases of deficiency, and all were attributable to local defects of pipes, cisterns, or ball-cocks. Mr. Cleave has since left my employ. [*Witness* spoke of some unpleasantness that existed between himself and the family of his late collector, one of whose brothers, he said, was a member of the Water Supply Committee of the Local Board of Health.] The local board of Eton are perfectly satisfied with the present supply.

Cross-examined by Mr. WILL: The complaints did not include objections to the insufficiency of the supply and the absence of high pressure. I do not supply one district from seven to four, and another district from four to seven. I endeavour as far as possible to give—and it rarely happens they do not get it—a supply for the whole twelve hours of the daytime. I cannot say there is a constant supply in all the streets of Windsor during the 24 hours. Some parts of the town are very high, and some very low. We pump the same quantity of water for most hours of the day, so that if at some hour there is a great draft of water at the low part there would not be sufficient pressure to fill the high cisterns on the tops of the houses in the high parts of the town, but still they always have a supply sufficient for their consumption. We keep a constant supply in all parts for some hours of the day. The mains throughout the town are not all charged at the same pressure during the twelve hours, because, of course, those in the low district would have a greater pressure upon them than those in the high district. They are all charged during the twelve hours. We used to supply different districts at different times. We are always pumping, and the supply, if a large fire were to break out, would continue. All the water could be directed to that particular part of the town. As to the pressure, I cannot say whether there would be at all hours of the day sufficient to force the water to the highest tap in the highest house, or whether there would be a constant supply in such places or not. At night the water is still on, but we do not pump at nearly so much pressure. Water is really all that was wanted in Windsor, because there is a volunteer fire brigade there; they collect the water from the main in a leather or canvas box, and they pump it out of that with their engine. They always have water enough. Lately they practised a mile and a half from the works, and found abundance of water. I believe on one occasion, when they were practising, there was a difficulty as to water. It would have been unfortunate had there been a fire; we could not inconvenience the domestic supply for the time they were practising. We propose to charge a lower rate for Eton, because there are very few houses supplied which are not at a high rent. At Eton water is easily procured from wells, and therefore we have but few customers there. At Windsor the water has to be pumped up a hill. In the list of towns I have handed in it will be found that where the supply is intermittent the rate varies from 5 to 6 per cent., and where it is a constant supply it is a rate from 7½ to 6 per cent. The rate to be charged for a supply depends upon the distance that the water has to be brought. It would not cost me £6000 a mile for my mains if I had to go a mile farther out of the town. My largest main is an 8-inch, and the cost per mile was something under £2000. Where there is no expense for pumping, of course an outlay for mains can be afforded. A lower rate can be charged where the water is supplied by gravitation. At Glasgow, by gravitation, the rate is 5 per cent., and there is a compulsory rate on all property, whether supplied or not, of 1*d.* in the pound. I have four wells, but do not work them all constantly; I have two worked constantly, and the third is very close to the others, so that the water filters through. Their average depth is 35 feet; one, an old well, is only 20 feet deep. The deepest well from the surface of the ground would be rather over 50 feet. It is, in fact, a mere well of 26 feet, with a 9-inch bore extending for 30 feet below. I call that a well of 50 feet. An artesian well, with only a 3-inch bore, which goes down a hundred or two feet, is called a well of so many hundred feet deep. My wells go a few feet into the chalk. I think if we were to cease pumping from them the water would rise exactly to the height of the water in the river.

Mr. WILL: Do you mean to swear that this water which you supply is not Thames water?

Witness: It is impossible to say where the water comes from that comes into a well. The soil of Eton consists of about 22 feet on the top of chalk, which is in depth some hundreds of feet; but I find, by sinking a well with iron cylinders through the gravel, and getting through the first few strata of flint on the top of chalk, I get an abundant supply of water. I do not think it can possibly be river water to come into the well at the rate it does, because it is of so very different a quality from the river water. Whether that difference would be produced by filtering through the gravel I do not know. I think it would. The cylinders are perforated, but we seem to get our supply out of the chalk strata. The object of the perforations was certainly with a view of getting river water into the wells, but it does not seem to have that effect. The farthest distance of our wells from my stream from the river is about 50 feet. There is a branch from the river. The sewage of Windsor goes into the river, but it is below my wells. The nearest well is quite close to the stream, but it is divided by a 2-feet wall of cemented brickwork. It is cemented about 14 feet deep. The water does not want purifying before we supply it—it comes out of the chalk quite bright and clear. It is 16° of hardness, according to Clark's process. I do not know that Thames water in all instances is reduced by treatment to 6°. I

have expended on the works in the last twelve years from £15,000 to £16,000. I have had to erect two high-pressure steam-engines, 12 and 25 horse power, with their boilers and engine-houses, and very much to modify the water machinery. I have also had to alter the system of mains, as wooden ones were in the town. We have a water-wheel which we work constantly, except when it stops for repairs. We have duplicate water machinery, besides the duplicate machinery for the steam power. The works are subject to a lease from the corporation of Windsor, dated 1696, by which my predecessors were to be allowed to supply the town for 500 years on condition of their affording a good and wholesome supply of water at a reasonable price to the corporation, and for this they were to pay to the corporation at their annual dinner two pair of fat capons.

Mr. WILL asked for the lease to be produced.

Mr. RICHARDS objected, and the objection was allowed by the committee.

Cross-examination continued: I propose to incorporate the General Water-Works Act, and hope to get 10 per cent. some day, but I think the rate proposed will preclude that. It is according to Lord Redesdale's suggestion that the bill is in its present form. I declined to allow the engineer of the corporation to go over my works, unless he gave me a written undertaking that his evidence, information, &c., should not be used in opposition to my bill; but I thought it would be better for him to defer his visit until after it had passed. It would have been unusual if I had allowed him to come to my works and pick holes in them. A member of the corporation has been over them by permission—not Mr. Cleave, certainly not. I received a letter stating that, as I had set the value of my works at £40,000, it was only reasonable that the public should have an opportunity of seeing them. I think it was very indecent of the Board of Health to endeavour to press that their engineer should visit my works under the circumstances, [Correspondence between Mr. Cutler and the local board was read.] By the original bill it was proposed that the works should be taken by a company in so many shares. The capital we proposed to rise was £50,000.

Re-examined by Mr. RICHARDS: My works I represented at £40,000 according to my own calculation. The additional £10,000 would have been called up as required. The works are on my own freehold. I supply the garrison at Windsor, and if some individuals were to prevent my opening the roads it might be a serious thing. The corporation have never interfered, but individuals have questioned my right to open the streets. The houses are not all supplied with cisterns.

Mr. *John Chapman*, examined by Mr. RICHARDS.

I collect Mr. Cutler's water-rates, and am in constant contact with the consumers. I have heard of no complaints of the incapacity of the works. People are perfectly satisfied.

Cross-examined by Mr. WILL: The water is given ten hours a day at high pressure—from six o'clock in the morning till four in the afternoon, all over Windsor and Eton—and during the night, from that time—that is, from four or half-past four till six o'clock the next morning—the water-wheel is working, filling up the town just as it is wanted. People had said that a ten hours supply by day all over the town would be sufficient.

H. Shrubsole, Esq., examined by Mr. RICHARDS.

I am the agent for the bill. The valuation originally stated in the preamble of £40,000 has been struck out, and various alterations have been made in accordance with the views of Lord Redesdale.

In answer to the COMMITTEE, Mr. *Shrubsole* said that the object of the bill was to protect Mr. Cutler's property, which property, after his death, was to descend to his children, it now being in danger. Mr. Cutler will have to pay all penalties as long as he lives.

By Mr. RICHARDS: Mr. Cutler can now charge what he likes, but he wishes to place himself under parliamentary protection, and also under restrictions. The only benefit which he would get really is the legal power to break up the streets.

Mr. *F. Buckland*, examined by Mr. RICHARDS.

I am of the firm of Messrs. Buckland and Son, house and land agents at Windsor and Eton. I am perfectly satisfied with the present supply of water, and I never heard any complaints.

Mr. *A. Shipley*, examined by Mr. RICHARDS.

I am a member of the firm of Burdge and Co., brewers. We consume about 4000 gallons of water a day, and are perfectly satisfied with the supply. We pay by meter, 6d. per 1000 gallons. It is not hard water, and is very good for brewing.

Mr. *Charles Noel*, a scripture reader, was also called to prove the satisfactory nature of the supply to the houses of the poor, amongst whom he was constantly going.

Mr. *John Sayer*, outfitter, and Mr. *W. T. Nixon*, a member of the Eton Local Board of Health, gave similar testimony.

Edward Easton, Esq., examined by Mr. RICHARDS.

I am a member of the firm of Easton, Amos, and Sons, engineers. We have constructed a good many water-works. I have examined the pumping power and the means of obtaining water at Mr. Cutler's. The pumping power at Windsor is ample. The supply there is practically inexhaustible. The works consist, first of all, of a water-wheel driven by the Thames, and, attached to this, there are two sets of pumps sufficient to supply Windsor on a constant service. There are besides two engines—a 12 and a 25 horse power—the former of which our firm put up about five years ago. The larger engine will raise about 310,000 gallons, and the smaller one about 250,000 gallons in 12 hours. The larger set of pumps will raise 240,000 gallons in a day and night, and the smaller set about 160,000 gallons, allowing half an hour for stoppages. The pumps would, therefore, provide a supply of 400,000 gallons a day—equal to nearly 15 gallons a head for 15,000 inhabitants; and there is a good deal more than that, taking the two engines; so that there is very ample power indeed. Twenty-five to 30 gallons per head is the maximum quantity ever allowed. The rate proposed of 4½ per cent. is lower than most towns of the size. I am personally acquainted with nine towns on the list, and I know that the maximum charge is 7 per cent. and the minimum 5½ per cent. They are towns varying from 8000 to 40,000 inhabitants—Great Grimsby, Holyhead, Ipswich, Northampton, South Essex, Whitby, Wisbeach, &c. Mr. Cutler has nothing to do with supplying the castle. About 11,000 people are supplied by the works. To give a constant supply an extra expense would be involved, and, as a matter of commerce, it must be paid for in some way or the other. With the apparatus as it is at the present moment, I should think it would cost from £500 to £540 a year. At Brighton there has been an alteration in the system of supply from the intermittent to the constant under the Act of Parliament. When the company for whom we were engineers applied for an Act to go back to the intermittent service it was refused, and, in consequence, the enormous waste of water made it imperatively necessary that we should have private mains by which this great waste should be made up; and, rather than put up the necessary works to pump the extra quantity of water, our company laid down a duplicate set of mains all over the town, in order that they might be able to give to every person either a constant or an intermittent supply, which is now the case; and we find that the people, when they are asked to make the alteration in their apparatus which is necessary under the clauses of the Act to supply constant service, would rather remain on the intermittent than go to the constant service. About one-tenth are on the constant system. I consider £40,000 is a fair value for Mr. Cutler's works. My father, who was to become a director, thought he should be justified in going into the undertaking at that valuation.

Cross-examined by Mr. WILL: I have not got the figures here, but I can produce them. The provisions in the general Act for the purpose of preventing waste are not sufficiently stringent. I am not an advocate for a constant supply at high pressure to every house. I think, as I stated before the select committee last year, it is very desirable that poor people should have a constant supply if it were reasonable. There is not so much difficulty in arranging the apparatus for the poor as for the better class of houses, where the water is taken inside and distributed all over the house in cisterns and so forth. I think Mr. Cutler's works are amply sufficient for producing a constant supply. If he is to give high pressure he will be obliged to use one of the engines day and night, and there will be a great deal of waste besides. The water could be raised 140 or 150 feet above the works. Some 300,000 gallons a day extra would have to be produced to supply the waste under constant service at high pressure. I have known the waste more than 40 gallons per head. It would require 45 gallons per head to give a constant supply to Windsor. In the town of Norwich it is more than 50. High pressure is not constantly on in London. My great objection to the constant service is, that the people will not make the necessary alterations in the service-pipes and so on. We could supply 8-inch pipes at £800 or £900 per mile. The works at Great Grimsby cost £13,000; at Holyhead, about £8000; Northampton, £80,000, I think—but that has been done at different times; Wisbeach, about £25,000; and Whitby, about £14,000. We are enlarging the works at Whitby.

By the COMMITTEE: We have been told there is a saving of 25 per cent. in the constant over the intermittent supply. That is not your opinion?

Witness: No; it entirely depends upon whether you are beginning a town afresh. If so, a constant service can be worked at a less consumption of water than an intermittent one; but then everything must be arranged for the constant service. Where you have to change from one system to another I am confident that the reverse is the case.

By the COMMITTEE: That is because you cannot ensure the proper arrangements being made for the change of system?

Witness: Yes; in the houses particularly.

FRIDAY, MAY 15.

Edward Easton, Esq., recalled, and examined by Mr. RICHARDS.

I can now produce items of detail with reference to the value of Mr. Cutler's works. I estimate the plant—that is, the steam-engines, water-wheel, the pipes and the mains in the town, the working plant—altogether at £15,140, to which must be added the value of the water power now in use working the pumps, which I have ascertained in the usual way by capitalizing the coals that would be burnt in order to produce a similar amount of power, and the men's time, and oil, and so forth, which amounts I have taken at 25 years purchase, making £12,437 10s. The land (an acre and a half) I valued at £500 and the goodwill, inasmuch as it is a concern which is now producing a profit, I have taken at six years purchase of £1950, coming to £11,700. To that I have added the cost of the bill, £1500, and that makes £41,277 10s. The preliminary estimate that was made of the works—namely, the £40,000—was taken on another principle altogether. It was taken in this way, that he ought to receive 20 years purchase of the present net income of the works—namely, £2000—which would be £40,000.

Mr. RICHARDS: Many corporations or local boards supply water ostensibly at a low rate?

Witness: Yes. The general practice is to charge the rate mentioned in the bill to the consumer, and then if there is any deficiency to make it up by what is called a rate in aid. The amount charged in many local Acts does not really represent the amount paid for water. Manchester is a well-known case.

Cross-examined by Mr. WILL: I can give you the details of my estimate of the working plant. There were 13,600 yards of piping, at an average of 7s. 6d. per yard, £5100. I have allowed 10 per cent. for the bends, branches, sluice-cocks, and fire-plugs, £510. A water-wheel and two sets of pumps, a set of 12-inch and one of 8½-inch, £1730. The brickwork in the water-wheel wall, the foundations for the pumps, and that sort of thing, £1200. The three wells, £1000. A 12-horse power engine, £900; the buildings for the same, foundations, and chimney cost £500. A 20-horse power engine, £2400, including buildings. The water-wheel house covering the wheel, £550. Then the river wall, the fencing, and sundry works, £1000; and sundry materials, £250. There are some 1200 yards of 7-inch piping, about 800 yards of between 8 and 10-inch, 4000 yards of 6-inch, 4000 yards of 4-inch, and 4000 yards of 3-inch.

The CHAIRMAN: With regard to the goodwill calculated at six years purchase, can you tell me of any Act of Parliament under which a goodwill would come in as part of the capital, which would be subject to the 10 per cent. limit?

Witness: I do not know of any Act which relates to the purchase of a water-works, except by a general clause, in which it is stated to be left to arbitration. Abroad it is generally reckoned at 20 years purchase. This is rather a peculiar case. It would not be fair to expect a company which had made 5 or 7 per cent. to sell its interest in its works to anybody, unless the means whereby that 7 per cent. had been obtained had been taken into consideration. I do not know of any company whose works have been purchased under an Act. There are many instances where works have passed by arbitration. I may instance the case of the Brighton Water-Works. The value of those works, when the new company bought them, could not be made up in the intrinsic value to a greater amount than £40,000 or £45,000, whereas the sum that was actually paid for them under arbitration was £92,500. They would be allowed to make a profit up to 10 per cent. upon the £92,500. The capital is now £230,000, and they are authorized to make a profit upon that amount.

Henry Shrubsole, Esq., recalled.

The COMMITTEE: We were told on a bill that now Lord Redesdale limits the rate of interest to 7 per cent. upon all new capital raised.

Witness: Supposing a company already incorporated, and having power to raise capital, came by a subsequent Act to raise further capital, it is quite likely that Lord Redesdale would upon that additional capital limit the dividend to about 8 per cent. It would depend entirely upon the circumstances—upon the condition of the company; and it is more particularly with regard to gas-works that his lordship is strong about limiting the dividend. He would not limit the dividend himself upon a company coming to Parliament for the first time for an Act.

Edward Easton, Esq., recalled.

The difference in the Brighton case was made up by taking so many years purchase upon the profits of the company.

In answer to Mr. WILL, Mr. *Easton* said that the 10 per cent. limit was

not fixed upon the money sunk irrespective of the capital, but upon the capital itself.

Mr. RICHARDS: Sometimes companies invest a great deal more in other ways than they sink in works, do they not?

Witness: Yes; as in the case of the Brighton Company.

The CHAIRMAN: You consider that what you call goodwill represents the sum which has been spent previously to the attainment of the large interest in paving the way to get that large interest?

Witness: It is the result of an expenditure which was unremunerative formerly no doubt. In the Brighton case, the company were allowed to make 10 per cent., as I have said, upon the money paid for the purchase of the works.

The COMMITTEE then invited the witness to hand in his estimate of the works in detail, which was as previously given.

Thomas Spencer, Esq., examined by Mr. RICHARDS.

I am an analytical chemist, residing in Euston Square. I have turned my attention a good deal to water. I visited Mr. Cutler's works at his request, in March last, and took samples of the water from the two wells that were then at work very close to each other. I made separate analyses as follows:—

	Grs. in Imperial Gallon. Well A.	Well B.
Substances formed.		
Carbonate of lime (chalk) and magnesia	9·65	9·76
Sulphate of lime (gypsum)	6·79	6·50
Chloride of sodium and trace of calcium (salt)	3·77	4·07
Iron and alumina	0·16	0·18
Silica	0·35	0·30
Organic matter, and loss	0·97	1·03
Total solid residue in a gallon	21·69	21·84
Hardness in Degrees of Clark's Scale.		
Before boiling	16·5	16·4
After ditto (five minutes)	9·0	9·0

I may remark that these samples differ so little from each other that they may be called one water. It is harder than the Thames water, as I have analyzed it about that spot more than once. The Thames water there averages about 14°—sometimes 13½, when there is a freshet in the river—but this water is about 2½° in excess of the ordinary hardness of the Thames water. I tasted the water, and found it very excellent to drink. [Sample produced.] It has stood for about two days after it was taken in this bottle, and placed in the light; and when a water will stand that without showing any signs of vegetation, it is really a good practical test with regard to very minute quantities of what is termed putrescible organic matter. Had there been the smallest quantity, some little greenness on the side of the bottle near the light would be seen. It has stood in the bottle since the 12th of March, and I let a little air in purposely, in order to facilitate anything in the shape of vegetation. It is a very pure water, but it is just such a water as one would expect, coming as it does. It comes through the gravel strata: and, even if it came from the river, still the gravel, containing as it does so much iron, would be sure to take out any organic matter that was in it. But I apprehend there may be springs also, because it is well known to all who are acquainted with the Thames, that much of the flow is derived from springs. Even in the driest weather there is always more water in the Thames than could be accounted for by its tributaries; and the fact of this water being 2° or 2½° harder, proves at once that it is not Thames water. I can hardly say where the supply for Windsor Castle comes from now. Several years ago I analyzed the water there at the request of the Prince Consort. We had a filter erected in the bed of the Thames, which I believe does not act; but there was some prejudice against the supply of the town, because it was considered hard, and the Prince's advisers were very much in favour of extremely soft water; and at that time the Prince had erected a filter of his own, which I was unfortunate enough not to approve of. I do not know exactly how the castle is supplied at present. The ingredients of the Windsor water are of about the same quality and character as those contained in the metropolitan water, but the organic matter is less, and at the same time the hardness is greater by about 2½°. But there is no metropolitan water that would stand the test to which I put this. It is exceedingly good—as good as is supplied to most capitals in Europe. The New River water would stand the same test—at least, that part of it that comes out of a spring, but not that which comes out of the Lea. The New River is supplied from two sources—from the Chadwell spring and from the Lea.

Cross-examined by Mr. WILL: The London water is from 13° to 14° of hardness. I do not know that in all the metropolitan water Acts the companies are compelled to reduce the hardness of the water by filtering it. They filter, but not to reduce the hardness. I have been asked how it was that the water was harder after filtration than it was before. There is always a little calcareous matter in the sand, and the carbonic acid of the water takes up some of the calcareous matter; and, in fact, in the case of the Lambeth Company, sea-shells are put in the filter-bed, and that sometimes puts two degrees of hardness upon the water. I did not test the action of the Windsor water upon lead, and I should be surprised to hear that there was any. I cannot tell whether the water I got was obtained from the well, which has a bore of 30 feet into the chalk. I did not notice a yellow colour in the bulk. This water is perfect [holding up the sample]. There is no decayed vegetable matter. It is the water without filtration. There was no trace of animal life whatever, microscopically or otherwise.

This concluded the case on behalf of the promoters of the bill.

Mr. WILL then opened the case for the petitioners, and called attention to the character of the persons who opposed the measure. He said they were the corporation of Windsor, and the representatives of the inhabitants, and as such they had most important duties to perform, setting aside all personal feeling whatever. The measure he could not help saying was a most extraordinary and unprecedented one, inasmuch as the names of the proposed company did not appear, and, in fact, there was nobody against whom the public could appeal if they wished to. How were the public to know, in case of complaint or of litigation, who were the owners of the works, if the names were not given? and he challenged his friend to point out any case where powers were given by Parliament to persons who were not named in a bill. He submitted that the corporation had offered to meet Mr. Cutler in a reasonable and proper manner; they had offered to leave it to arbitration, with a valuer on each side, but all their efforts had proved futile. Mr. Cutler declined their proposition, and they had no alternative then but to oppose the bill, in order that they might by so doing obtain something that would give them protection for the future. The committee were asked to give to Mr. Cutler, by means of the bill, powers which he never possessed before; they were asked to give him a monopoly which he never possessed before; they were asked also to give him compulsory powers that he never possessed before; and besides these things, powers to charge what rates he chose for giving even an intermittent supply of water to the town. All this the learned counsel contended was unfair and unreasonable, and ought not to be allowed. The rate proposed to be charged, the amount fixed for the valuation, and the refusal of Mr. Cutler to admit the engineers of the petitioners into his works in order that they might test their value, were descanted upon at length, and evidence, the learned gentleman said, would be called to rebut the statements that had been made, particularly as to the value of the works, the purity of the water, and so forth.

The following evidence was then called:—

Mr. *J. W. Wellman*, examined by Mr. WILL.

I am mayor of the borough of New Windsor, and chairman of the Town Council. In 1865 complaints were made to Mr. Cutler about the intermittent supply of water. It was not on constantly, and each of the two districts, I believe, used to be supplied only for about ten hours daily. The intermittent supply has caused great inconvenience to the inhabitants. The cisterns have been empty, or only improperly supplied. I do not think the supply as it is at present would be sufficient in case of a fire, unless the turncock was informed of it, and the water turned on in a proper manner.

Mr. WILL: Unless the turncock was informed some time before the fire.

Mr. RICHARDS: That is not what he said.

Witness: It is what I mean. There would necessarily be some delay in communicating with the turncock. It is an objection to the bill that no provision is made to remedy this. We have had a new assessment for Windsor lately, and we think the rates proposed to be charged are considerably too high. At the very outside they ought not to exceed 3½ per cent. upon all property in Windsor, or else 4 per cent. upon private houses, and 4 per cent. less two-thirds upon the high assessment of shops—all upon the rateable value, of course. Subsequently to 1865 the local board passed resolutions for the purpose of acquiring the works, if they were to be obtained. I believe that the Eton sewage goes into the river near to the works, and some provision ought certainly to made in the bill for the purpose of bettering the character of the water. The local board are not in favour of the bill, and rather than it should pass they would, as a public body, take the matter into their own hands.

Cross-examined by Mr. RICHARDS: There is very little difference of opinion amongst the members of the local board. I believe the police have tools for turning on the water. I myself have never suffered any inconvenience from the intermittent supply. Mr. Cutler, I believe, has asked £40,000 for the works, but we think they are not worth more than £15,000.

Mr. *Thos. Chamberlain*, examined by Mr. WILL.

I am a member of the Town Council. I do not think the measure is calculated to be for the public benefit. I think it is inexpedient that the supply should be in the hands of one individual, but inasmuch as our forefathers granted this lease for 500 years we find ourselves rather in a fix; otherwise we might take the supply ourselves. I think that the supply for Windsor ought to be constant and on pressure. We have been afraid of the insufficient supply in case of a fire; and, in respect to sanitary purposes, a short supply of water endangers the public health. We object to the proposed rate as being excessive; we object to an advance of 10 per cent. [Resolutions passed at the meetings of the local board were read.] It was proposed that the Windsor Local Board, in conjunction with the Board of Health of Eton, should purchase the works at a price to be fixed by valuers, and a referee in case of difference, and that the purchase-money be paid in proportion to the rateable value of each district. The Eton board objected. They said their constituents would not like to undertake such a burden, inasmuch as all along the course of Eton Street anybody, by sinking a well about 10 or 12 feet, could get water, for the water percolated all along the Thames valley from the river. Not more than ten persons have Mr. Cutler's water between Eton Bridge and the college. The majority have wells. In our borough the return at 4 per cent. would be £2281 a year, making allowance for lands which are rated and for houses which would not take the water; and at 3½ per cent. it would be £1995. I do not know the precise amount of the valuation of Clewer beyond the borough. Some years ago I was connected with Jennings's brewery. It was supplied with water from its own well, a well situated very much as Mr. Cutler's are, that is, near the river. The water was good at most times of the year; but in the autumn, when vegetation was decaying, then the water, though it went through 50 or 60 yards of sand and gravel, was impregnated with the taste of this decaying matter, and in order to get good water the firm determined upon sinking an artesian well, 600 feet deep, right down into the chalk. The sewage of Eton runs into the stream of the river immediately below Mr. Cutler's works. If the water-wheel were to cease working for long, the result would be that the wells would be impregnated with the sewage matter. The Eton people consider that the proposed 3½ per cent. was a kind of bribe to induce them to withdraw their opposition, and they objected to it.

Cross-examined by Mr. RICHARDS: The sewage will shortly cease to flow into the Thames. We have had notice given us to that effect.

The witness was cross-examined at some length with respect to the provisions contained in the Water-Works Clauses Acts, as to the insertion of fire-plugs.

Mr. *H. Darvill*, examined by Mr. WILL.

I am an attorney and town-clerk of Windsor. I have considered the policy of the measure, and consider it very impolitic that the water supply of the borough of Windsor should be committed to any private person. It ought to be in the hands of a company or the corporation, and then evils could be corrected. There are many contingencies attached to a supply of this kind. Mr. Cutler is a highly respectable gentleman no doubt, but he might die, or his works get into the possession of other persons; in short, there are so many contingencies that I think it is very undesirable that works of this description should be in the hands of a private proprietor with parliamentary powers. I am not a valuer, but I have a strong opinion about the value of these works, because some time since I was consulted about the construction of large works for supplying Windsor, Eton, Slough, and Maidenhead, from the hills above St. Leonards, and I went into the whole question of cost on that occasion. My belief is that works could be constructed to supply Windsor with 600,000 gallons a day, with all the mains and engines complete, for a sum of £10,000; therefore I do not see why Mr. Cutler should be paid the enormous price he asks. I consider that £40,000 is an outrageous sum; it is impossible the works can be worth that amount. The difficulty would be that, if we were to take them at £40,000, the maximum of 10 per cent. upon that would be £4000. The lease, I think, was granted *temp.* Henry VI. My opinion of it is, not having seen it, that it is *ultra vires*. I consider the rate proposed excessive. It would give, in all probability, a profit of £2700. If the works were constructed for £10,000, it would not cost more than £800 a year to manage them. The rateable value of Clewer parish is, gross, £25,000; net, £21,000. New Windsor, gross, £40,000; net, £32,000. The extra-parochial part of the borough, or the lower ward of the castle, is £1851 gross and £1400 net. The gross estimated rateable value is £67,000. Eton would be about £15,000 a year. The rate proposed would give about £3500 a year as income; so that, if the working expenses were £800, there would be £2700 for profit. A constant supply at high service is particularly desirable for Windsor.

Personally I may say I have had nothing to complain of since Mr. Cutler made various alterations in his works.

Cross-examined by Mr. RICHARDS: We do not begrudge him a fair trading profit of from 7½ to 10 per cent. Under the gas Act, 7½ per cent. is settled as the limit.

Mr. RICHARDS: Under what Act is that?

Witness: Every bill which comes before Parliament has a clause put into it that it shall not exceed that amount. I believe that the London brewers do not make more, on an average of years, than from 7½ to 10 per cent. I know that even the large firm of Truman, Hanbury, and Co., did not make one farthing profit in one year—last year or the year before.

The CHAIRMAN: The committee want to hear about water rather than beer.

Mr. RICHARDS: Do you think it reasonable and fair that a local board, backed by public rates, should come into competition with private enterprise?

Witness: If private enterprise is unreasonable, as I think it is in this case, I think so. I think this bill arises out of the contemplated opposition of the Slough Bill. It has been brought out so that Mr. Cutler may have a *locus standi* to prevent the Slough people from serving Eton. I dare say it would be reasonable to consider the plant of Mr. Cutler's works, and also the goodwill, for the purposes of a sale. I did not hear Mr. Easton give his valuation, but my impression is that the works have been reconstructed three or four times; so that the cost has been increased by those means. I know that the mode of working them has been altered. First, it was attached to a water corn-mill; and then from time to time other systems have been adopted.

Re-examined by Mr. WILL: I consider that it would be unfair to take the goodwill into account for rating people upon the amount. The great objection to the works is that, instead of having this system of circulation, which is intermittent, they ought to have built a large tank or reservoir which would always be full and supply those pipes continuously. That has not been done, and the reason that has been alleged is that Mr. Cutler could not find the ground that was necessary for his doing so.

By the COMMITTEE: I know of no attempt being made by the corporation to break through the lease. I think they might. I believe it to be a vicious lease. Mr. Cutler could not lay down a pipe in Windsor if I chose to obstruct him.

Mr. *Thos. Cleave*, examined by Mr. WILL.

I am a member of the Town Council. I have both made and heard complaints as to the water. We require a constant supply at high pressure. The council consider that the public will be much imposed upon by the scheme if it is allowed. It would be putting a considerable sum into Mr. Cutler's pocket without the works being improved so as to benefit the town. I have heard that several parties who signed the petition in favour of the bill acted under a mistake; they thought they were signing against a rival scheme at Slough.

Cross-examined by Mr. RICHARDS: I would allow 4 per cent. upon the rateable value, or 3½ per cent. upon the gross value. There is no reason, if the bill is thrown out, why the corporation should not consider a proposal for supplying the town themselves.

Mr. *H. W. Jones*, examined by Mr. WILL.

I am a member of the Town Council, and agree with the last witness as to the inexpediency of the measure. I know there have been a great many complaints made as to the supply. There is great objection to the rates as proposed by Mr. Cutler. The new assessment is nearly double what the old one was, and he merely proposes to charge a rate of 4½ per cent. instead of 5 as heretofore. The supply of Eton College and all the country districts would be so much additional profit.

Cross-examined by Mr. RICHARDS: I say that in valuing works for an Act of Parliament it is perfectly absurd to value goodwill. A man who gets money for goodwill parts with the property. Goodwill is the price for his enjoyment of the 10 per cent., and he cannot get both the 10 per cent. and the goodwill. The market value might be a tolerable rule, but still gas or water works never fetch 20 years purchase; generally, as a rule, they fetch about 12½ per cent.

MONDAY, MAY 18.

The CHAIRMAN said that the committee had considered the fact that any person had the power to stop the breaking up of the streets for the purpose of laying mains in the town, and they wished to suggest whether some arrangement could not be come to upon the basis of a valuation of Mr. Cutler's works by arbitration, taking in as elements of valuation, on the one hand, the lease as it existed, and, on the other, the fact that he was subject to the possibility of being prevented from laying down his pipes, and also that important consideration, the limit of profits to be allowed upon such valuation, and whether a clause might not be inserted by which the corporation should be allowed to purchase the works at the valuation named within a stated period.

Mr. WILL said that the possibility of Mr. Cutler being prevented in laying down his mains existed only in theory. The petitioners would receive any offer in a friendly spirit.

Mr. RICHARDS said that the promoters could only repeat the offer they had made upon the basis of the valuation—namely, £40,000.

Mr. WILL stated that no such offer could be entertained.

Mr. *John Cleave*, examined by Mr. WILL.

I am a commission agent of Windsor, and collector of the general district rates. The gross estimated rental of Windsor parish is £40,091. The gross value of Windsor and Clewer is £60,205, after deducting for land. At 4½ per cent. the income would be £2709 5*s.* 2d.; at 4 per cent., £2408 4*s.* 7d.; and at 3½ per cent., £2107 4*s.* Mr. Cutler also derives an income from supplying Eton College, the deans and canons of Windsor, and the barracks. [An abstract of persons whose annual charge would be raised by the new assessment was handed in.]

Cross-examined by Mr. RICHARDS: There will be an increase of more than £150. Some persons, of course, will have to pay less.

W. Collett Homersham, Esq., examined by Mr. WILL.

I am a civil engineer, and have had some experience regarding water-works. I went to Windsor in April last to ascertain the value of the works and their efficiency. Mr. Cutler's manager said that his instructions were not to admit me unless I gave a written undertaking not to use the evidence before this committee. I, therefore, made the best examination I could from the outside. I estimate the capital required at £6042, including the cost of more pipes than there are at present. I have estimated for 300,000 gallons per diem. The total annual expenses I make thus—wages and coals, £512 4*s.*; wear and tear and depreciation of engines, 7½ per cent. on £1011 11*s.*, £75 17*s.*; ditto on buildings and pipes, 2½ per cent. on £3984, £94 12*s.*; management and taxes, £162 7*s.*; making a total of £850 per annum. To this must be added interest on capital at 5 per cent. on £6042, £302 2*s.* That would make a total of £1152 2*s.*, from which I have to deduct the value of 25,000 gallons (for trade and Board of Health purposes) at 6d. per 1000 gallons, £228 2*s.* 6d., leaving £923 19*s.* 6d. I think that 2 per cent. on the rateable value of the property proposed to be supplied, £53,480, would fully recoup the working expenses, and pay 7½ per cent. upon the capital, and an ample sum for maintenance and for wear and tear. On the gross annual value it would be 3 per cent., considering the manner in which a town like Windsor ought to be supplied—namely, at high pressure upon the constant system day and night, and with pure water to a height of 150 feet, I estimate the cost of these works at £12,297. The water would be softened and pure, and there would be a four hours supply in a tank to maintain the pressure. I calculate the waste at 25,000, as against Mr. Easton's 300,000. The decimal point in his must be wrong. I have some tangible experiments with reference to the waste of water. In a house it will be found that if you have a cock which is leaking both at the bed and at the cone, the leakage is one imperial pint in about three-quarters of an hour, or four gallons per day. If you have a cock that is running a stream of about 16 inches, you will find that it takes nine minutes, or 20 gallons per diem. If, then, the average of this is multiplied by 2000 houses, it would give 24,000 gallons. I have not gone into the waste upon the mains.

By the COMMITTEE: My manager could ascertain in which district the waste was taking place by testing the mains. I believe it is a mistake when we hear of the quantity of water that is consumed under the high pressure constant system. I do not believe that it occurs in the houses, but in the mains, through the bad laying. I have not the slightest doubt that the constant is more economical than the intermittent supply.

By Mr. WILL: My estimates go to purifying the water by Dr. Clark's process, which is merely this: You mix a certain quantity of lime with the water, by which you take out the extra lime which is held in it. It forms a filtering medium, and not only softens the water, but takes down with it any matter that may be floating about in the body of the water. I consider Mr. Easton's valuation of the plant—viz., £15,140—excessive. He takes the cost of 13,600 yards of piping at 7*s.* 6d. per yard, £5100. I estimate it at £2240 if my information is correct, with one-third more for Eton. Then for 12-inch pipes and gearing £600 seems to be a most enormous figure.

Mr. WILL: We have heard that £15,000 was expended under Mr. Cutler's own supervision.

Witness: I should say it was amateur engineering decidedly. I would not have the water-wheel at all, because you cannot depend upon it. I put it down merely at £5 a year per horse power. I do not think the "pretty little sum" of £11,700 put down by Mr. Easton as the goodwill ought to be considered by the committee in fixing the value of these works. If I was an arbitrator I should not give it. Of course it would be a different thing if the works were going to be sold. I can name several towns where the rate is less than 4½ per cent. At Carmarthen, with a population of 9700, the rate is 4d. in the pound upon the rateable value; at Coventry, 3 per cent., population 41,000, and supplied by the corporation; Darlington, a little under 4 per cent., population 15,799, and supplied by the Board of Health; and Dewsbury, 3 per cent., without any charge for water-closets or baths. At Halstead the rate is £2 16*s.* per cent., and the water is supplied by the board. Ilfracombe is something under 2 per cent; and at Leamington it is £3 per cent. on a £50 rental, and £2 10*s.* afterwards. At Leicester the corporation is charged only 2d. per 1000 gallons; at Newark-upon-Trent it is £1 4*s.* 8d. upon the £100, with reductions. At Taunton, a private company, the rate is £4 8*s.* per cent. When I was a boy we were told that a town could be supplied for £1 per head capital. At Brighton, which has been much talked of, the rate is 3¾ per cent. on the rateable value, without anything extra for water-closets; it is in the hands of a private company, and the local board pay only 5d. per 1000 gallons, and that is after the company have paid £50,000, as we have been told, for nothing.

Cross-examined by Mr. RICHARDS: I have heard of cases where a local board, in making a water-rate, supplements it by a general rate; but I do not know cases where the water and gas are joined together, and worked by a corporation or local board except Manchester. I have never been engaged in the sale of either gas-works or water-works by arbitration. I think that in buying a water-works you should pay according to the profits. There is no goodwill in this case, in my opinion, because any inhabitant can practically stop the works. If the works were stopped to-morrow the goodwill would be done for.

Mr. RICHARDS: What water-works have you ever erected? Just give me a catalogue of them; but give it to me slowly, that I can take them down.

Witness (smiling): I have erected none, but my brother has, and I have known all about them.

Mr. RICHARDS: That is like the old story: "'Do you play the German flute?' 'No, but I have a cousin who does.'"

Witness: Yes; but I have played the flute myself in these water matters very often. I am a consulting engineer, not a manufacturer. Messrs. Easton knew on which side to put the value. I laughed when I first saw the £40,000. I think £15,000 for the plant is quite ridiculous. I should not include the cost of obtaining this Act of Parliament in estimating the value of the works. When a person comes to protect his property he must expect to pay for it himself. The value of the source of the water I take with the land, and I allow for the sinking of the wells afterwards. The land is valued as containing the water. I should buy the water with the land. I could sink two wells 30 feet deep and 6 feet in diameter for £192. Caterham and the Chiltern Hills are now supplied with water softened by Dr. Clark's process. I have estimated for 1056 yards of 7-inch mains at 8*s.* 9d.; 2464 yards of 6-inch at 6*s.* 9d.; 1760 yards of 4-inch at 4*s.* 3d.; and 7040 yards of 3-inch at 3*s.* 5d.; and I allowed 10 per cent. for cocks, bends, &c. I am not at all surprised to hear that a second set of mains has been laid down at Brighton; they found their leakage so much, I expect, in their pipes. I have heard it said that the consumers prefer an intermittent supply, but I believe that is only Mr. Easton's opinion. I am not aware that Mr. Cutler is an associate of the Institution of Civil Engineers. That would not alter the case that the works could have been carried out for a much less sum.

By the COMMITTEE: I have only estimated the cost of the works as I could have carried them out myself.

Mr. *James Fenton*, examined by Mr. WILL.

I am a civil engineer, and have had 20 years experience in the construction of water-works. I constructed those at Chelmsford, Braintree, Swindon, and for six years I was the engineer of the water-works at Croydon. I have sunk several artesian wells. I went to the works of Mr. Cutler, and, like Mr. Homersham, was refused admission. Taking the works as they are at present for the supply of both Eton and Windsor, I should say they could be constructed for about £12,000, including all the expenses, and also upon Mr. Easton's calculation that 13,600 yards of piping were required. [Witness analyzed the estimate of Mr. Easton.] I think the pipes are not worth more than 5*s.* on the average, or £3400 against his £5100. The water-wheel I put at £650 against his £1730, but I cannot tell what state it is in. £1200 is rather an expensive (mill) rate. I should not have supposed there was sufficient fall to cause an expense like that. I have had a similar engine constructed at a much lower cost (£600), but then I think this was probably very well done, because I know Messrs. Easton and Amos. They are men

of ability and character. The estimate of Mr. Easton for water power now in use—£12,437—I think is excessive. There is a more powerful wheel in a mill adjoining, the rent of which is only £180 a year. I think, however, it would be worth more than Mr. Homersham has put it at. I think the supply to Windsor ought to be under pressure. I should say that the defect in the works arises from there being no reservoir; no water-works are complete without one. I have not calculated works constructed as these are. I think they are very objectionable as regards the mode of taking the water supply direct from the Thames, which they do beyond question. The Thames in winter is so thick and cloudy with sand and mud, and the refuse and sewage of Oxford and Reading, and a number of towns on its bank, that I think, without cleansing or filtering, or doing something with it, it is not a reasonable thing to grant an Act of Parliament for using that water. An artesian well ought to be sunk; or, if the water is taken from its present source, it should be filtered or softened in some way. They would get an abundant supply from the chalk. I calculate the cost of a well at £700. Altogether I estimate that works could be done superior to the present ones for £8000, including a pressure reservoir, which I set at £1150, and with a constant, not an intermittent supply. At Swindon Water-Works there are two 14-horse-power engines, with a 12½ cylinder and a 24-inch stroke, double-action pumps, which cost only £1110. Eight miles of pipes have been laid there for £4130; there is a tunnel under the canal, £200; hydrants, sluices, and so on, £330; and a high-pressure reservoir, £900. There the only important thing is a storeage-reservoir, to hold 18 million gallons, which has cost £2800, and which would not be required at Windsor; and also a drain up a valley, to collect the water. The total is £10,306; but, deducting the reservoir, it would leave only £7000 odd. We pump at Swindon 430,000 gallons per 24 hours with two pumps. The Great Western Company take from 150,000 to 350,000 gallons a day, at 3½d. per 1000 gallons. Swindon is supplied from springs in the chalk. I do not agree with Mr. Easton as to waste; but I think there is an enormous waste of water in Windsor at the present time, in consequence of there being no retaining-reservoir to hold the surplus water which they pump. They have no alternative now; if they keep their mains charged, they must have an overflow constantly running to waste. I think they pump into a small tank in the cloisters, and it runs to waste. We have heard that Windsor is using 440,000 gallons a day for a population of 12,000, which is perfectly absurd. There must be waste somewhere, and I contend that you have more pressure upon your pipes under your present system than if you had a constant service. They have such an immense concussion and reaction from the fire-plugs when they are opened, in consequence of having no pressure-reservoir. The pipes would stand a pressure of 160 feet a head just as well as they will the present pressure. I have formed this opinion from the evidence I have heard in the room.

Cross-examined by Mr. RICHARDS: I do not think it would be unreasonable if they were to charge 7½ per cent. at Swindon upon the gross rental. It is a country parish, and the source of supply is three miles from the town.

Mr. *J. Pyecroft*, examined by Mr. WILL.

I am the landlord of the Castle Hotel, Windsor. I have considered the bill, and I must say that if Mr. Cutler sells his water at the same price that he does now I should not object to his continuing to do so. I think the proposed charge is excessive. The supply should be constant, and I do not object to the pressure as at present. I signed Mr. Cutler's petition in opposition to Mr. Nixie, who was bringing out a bill then for establishing water-works at Slough.

Mr. *F. Browne*, examined by Mr. WILL.

I am the surveyor of the Local Board of Health. I think there should be a constant supply of water, and at high pressure. Some weeks ago I took a sample of water from the main in High Street, and handed it to Mr. Campbell.

Cross-examined by Mr. RICHARDS: I took the water from the hose of the stand-pipe, which had been in use six hours that day.

Mr. *W. Underhay*, examined by Mr. WILL.

I am an auctioneer. I consider that the supply should be constant and under pressure, and in the hands of the corporation.

Dugald Campbell, Esq., examined by Mr. WILL.

I am the analytical chemist of the Brompton Hospital, and some time ago was demonstrator and lecturer upon chemistry at University College. I have made a chemical and microscopical examination of the water handed to me by Mr. Browne. When delivered to me it was perfectly clear, but when exposed to a tube, to be looked at to a depth, it had a yellow tinge that indicates the presence of some organic matter. I estimated the solid contents in a gallon, and I found there were 24 grains, of which about 23 were mineral, and one grain organic matter, or matter that will carbonize, and will become black on burning away. Then the water, after standing for 12 hours, gave a deposit of a brownish colour, which I separated from the water, and examined under a microscope, and found it to consist principally of peroxide of iron, and also some small quantity of decayed vegetable matter, and three or four specimens of animal life of the class *infusoria*. The mineral matter I found to be composed of the usual substances—silica, peroxide of iron, carbonate of lime, sulphate of iron, and so forth. I found a little more solid contents than Mr. Spencer did; he seems to have found about 21½ grains, whilst I found 24 grains. The hardness of the water was 16½° before boiling, and after boiling half an hour I found it 6½° of hardness. I noticed the action of the water upon lead. After exposing some bright lead for 30 hours, I found there was a decidedly strong action, which I considered due to the organic matter. I was engaged in the water supply of Glasgow many years ago, and have had to investigate into a number of cases of lead poisoning; amongst others those at Claremont, and it appeared to me, upon examination of this water, that it very much resembled the Claremont water, and that led me to try its action upon lead, and the result was decided. I should say that the Windsor water is not a fit and wholesome water to be supplied to the population there, but it might be made so in two or three ways. In the first place, I think it should be drawn into a settling-reservoir, and then submitted to proper filtration, and then it would be in about the same state as we have our supply of water in London. Another process would be to submit it to what is called the softening process of Dr. Clark, which is much better than the subsidence and filtration process. I softened some of the water, and found that, instead of it containing 24 grains of solid matter, it then contained 12·2, of which 11·6 was mineral matter and 0·6 was organic matter, and the hardness was 5°.

By the COMMITTEE: The purest of all water acts most energetically upon lead, and it was this circumstance that led to the inquiry at Glasgow, because the Glasgow water was so remarkably pure and free from mineral matter that it acted most energetically upon lead. This was the objection that was taken to supplying Glasgow with it.

By Mr. WILL: The action on lead generally decreases with the amount of hardness in the water, but I may say this, that hard waters which act upon lead when they are submitted to this softening process of Dr. Clark's, do not then act upon lead generally; it removes some of the organic matter out of the water that seems to act upon the lead. I have had considerable experience with regard to the water of the Thames. The water submitted to me appeared to be unfiltered Thames water—that is, with only just as much filtration as would be unavoidable in the course of its going through the gravel. If it had a large distance to pass through the gravel it would be oxidized to a certain extent, and have some of the carbon out of it. It is not equal to the water of the West Middlesex Company; it is inferior to it in many respects. In the first place it is coloured to some extent—to an extent greater than that water; in the next place it is harder by two or three degrees both before and after boiling; in the next, it gives a deposit on standing, which is very objectionable. Dr. Clark's process is not an expensive one. It might almost be made self-supporting—that is, there is so much chalk deposited above what is put into the water, and of such a pure character, that it might be sold for many trades; for instance, in soda-water making. The yellow tinge would be more likely to increase in the autumn, when the decay of vegetable matter took place. [Witness produced some water treated with Dr. Clark's process, which was said to be pure, and placed it in comparison with a specimen taken from a tap at Windsor, both of which were inspected by the committee.]

Cross-examined by Mr. DENISON: The water analyzed by Mr. Spencer is certainly very superior water in colour to the one produced to me by Mr. Brown. I cannot account for it, especially as Mr. Spencer's water is now two months old. It is a much nicer looking water. The water produced to me I think is a bad water. When coloured it is objectionable, as we do not know what the colouring matter may be. There is a deposit which, besides oxide of iron, consists of decayed vegetable matter and animal life. It is organic matter of a putrid character, and the tenth of a grain might do harm. I never found animal life in filtered Thames water supplied to the metropolis, but there is about the same organic matter in them. The West Middlesex, I think, contains about a grain of organic matter in a gallon. I believe organic matter in the London water varies from nine-tenths of a grain up to a grain and two-tenths in a gallon, depending upon whether the water is properly filtered or not. I believe that the largest town that is using Dr. Clark's process at the present time is Aylesbury. The Plumstead Water-Works Company used it to a considerable extent at one time, but they sold their works to a Kent company, and I understand that company does not use it now. The process is upwards of 20 years old. Caterham, I believe, is using it, so also are one or two of the Government works. I do not dispute Dr. Spencer's theory that if water will keep since March and look as good as that it is very good water. I have not heard of anything approaching to lead poisoning in Windsor or Eton. By the test I used I got a distinct quantity of lead in solution, as much, I should think, as would produce paralysis if the water was used for any length of time for drinking.

Mr. DENISON: Then if that water has being going through leaden pipes for all these years, and acting upon them, not for hours, but all through, year after year, can you account for nobody having been poisoned?

Witness: It might possibly be so, nevertheless. I have known water supplied to a town for 20 years which acted strongly upon lead, and yet the townspeople never knew that it did so.

Mr. DENISON: Although a single gallon, treated in the way in which you have treated that, produced enough to poison them?

Witness: It produced poisonous water. It produced water that would poison, but not sufficient to poison a man with that one gallon. If he went on drinking it for a long time it might eventually cause death, though really death from lead poisoning is a very scarce thing indeed. I am not aware of any case having occurred.

Re-examined by Mr. WILL: I have heard that some of Mr. Cutler's wells have the cylinders perforated, so as to admit the surface water, and that one of them has a bore of 30 inches into the chalk. If my water came from one of the wells other than the one not perforated, and supposing that Mr. Spencer got his from the one which draws its water from the chalk, that would account for the difference between the two waters.

This concluded the case on behalf of the petitioners.

TUESDAY, MAY 19.

Mr. WILL handed in the names of four of the metropolitan companies who obtained water from the Thames, in order to show that whilst provisions were made in their Acts compelling them to give a constant supply, the rate at which they supplied it did not exceed 4 per cent. on the rental.

The COMMITTEE said that this was a peculiar case, involving some difficulty. The proprietors of an old concern had come there to obtain a parliamentary status. Now, clause 75 of the General Water-Works Act, which was sought to be incorporated in the bill, provided that where no rate was prescribed the profits to the undertakers should not exceed 10 per cent. upon the paid-up capital. They (the committee) wanted to know what was the paid-up capital in this affair, because it could hardly be contended that the proprietors should be allowed to capitalize their present earnings, and then, by putting themselves under the general Act, become entitled to 10 per cent. more upon the capitalized income.

Mr. DENISON said that he intended to deal with the question, as it involved the consideration of what was the value to be put into the bill. He did not know whether his friend would assent to the preamble of the bill being passed subject to questions of this sort.

Mr. WILL: No.

Mr. DENISON said he expected that answer. Well, then, the corporation of Windsor came there to say that this bill ought not to be passed, and the reason they alleged was that the supply should be in no other hands but theirs. This, he thought, was not an exaggerated view of the case which the opponents had placed before the committee. It must be remembered that if the bill was rejected they had not the slightest legal means to get possession of the works, but with the consent of Mr. Cutler they might begin to-morrow to sell the water at an agreed price. The result of the bill being rejected, then, would be that Mr. Cutler must make such bargains as he could with his consumers; but then would come the question whether the corporation could avail themselves of their powers to prevent him breaking up the streets. He would deal with that at once. He had stated at the beginning of the inquiry that any one mischievous person might, no doubt, obstruct the opening of the streets whenever Mr. Cutler wanted to lay down fresh pipes, or to repair the existing ones; but it must be remembered that Mr. Cutler held a lease under the corporation, and certainly by that lease alone they were stopped from interfering, so that any question as far as they were concerned he would lay aside. Then as to the right of the inhabitants, all he would say was that if Mr. Cutler was not allowed to break up the streets the people themselves would suffer, because they would be deprived of water. It was, therefore, quite plain that that difficulty could not be seriously looked upon as an ingredient in the case of value, though it might be a common difficulty which both parties were under. Again, the local board of the town were Mr. Cutler's lessors; they had put him in the position in which he was, and therefore it would not be justice to allow them to gain possession of his works by any arbitrary way whatever. The cases were extremely rare in which a corporation was allowed to buy water-works under compulsory

powers. It would be out of all reason for the corporation of a town who had made a bargain long ago to come and break through a lease, in order that they might get the works of an individual for themselves, and for a sum which was very far below their real value—namely, £10,000 or £20,000. In short, they wanted to buy for that amount a going concern with all its plant, which was producing a profit of £2000 a year.

Mr. WILL: We propose to take them by valuation.

Mr. DENISON said he should like to see the Act of Parliament giving power to a corporation to take works at a valuation based on what those works could be made for. Then as to the value, he begged to remind the committee, that those who had been examined on behalf of the corporation had arrived at their estimate of the value of the works by a very different process to that which Mr. Easton had adopted on behalf of the promoters of the bill. It was not unreasonable either that there should be added to that amount six years of goodwill; certainly for a concern like this nobody with any degree of justice could say that it ought to be less. It was not as if persons could open an opposition and ruin the possessor of these works at once, and although the corporation, as a local board, had power to deal with the works, they were actually prohibited by their lease from starting any in opposition to them. The learned counsel contended that £40,000 was by no means an exorbitant sum for works of this description—they were not only going, but growing; they had been enlarged purposely that the supply might be extended as the town itself increased, and although the profits might only be £2000 per annum, that amount would be considerably increased, no doubt, in the course of a few years. Then as to purity of the water, it was evident that the opposition which had been raised amounted to nothing, because the corporation themselves were willing to purchase the works at an arbitration value. If the water was so very impure and so unfit for domestic consumption as they sought to make it appear, one would have thought they would have declined to have anything to do with the works whatever, but would have turned their attention to getting a proper supply elsewhere. He considered the test applied by the corporation absolutely ridiculous. They had not given Dr. Campbell water from the well, which they said was subject to the draining through from the Thames, but they had taken it from a dirty hose lying in the streets of Windsor, and had asked him to examine that, and the result had been what was all along expected—that the water which Dr. Campbell had analyzed was inferior to that which Dr. Spencer had tested after it had stood for upwards of two months exposed both to light and air. He (Mr. Denison) submitted that if the works were to pass to the corporation there was no security that a better supply would be given to the inhabitants than they had at present. They came there and talked about the insufficient security, about the difficulty of recovering penalties against persons whose names were not known, and so on; but who, in the event of the works being transferred, would be able to get penalties against the corporation of Windsor? And if so, who would have to pay them? Why, the wretched men who sued them, because they would be ratepayers, and, consequently, would have to bear the burden themselves. Therefore it was that Parliament was slow in giving power for water-works to be taken into the possession of a corporation by arrangement. As to taking them compulsorily, that was a case which, he was glad to say, was extremely rare. On the whole, then, the people of Windsor would be better protected by having the corporation standing between them and the lessee of the works than they would be if the works were in the possession of the corporation themselves. Absolutely, no person had complained of the water supplied by Mr. Cutler. Although the corporation had advertised as long ago as 1864 for complaints, no one had appeared to speak against either the quality or the insufficient supply. At present the water was on for 12 hours a day, and he should like to know whether the corporation themselves proposed to give it for a greater length of time. Could they give a constant supply without having to spend more money? And, again, could they obtain powers to spend it? Rather than take the bill at a confiscation price, Mr. Cutler would run the risk of breaking up the streets and supply the town in the best manner he could. The works, he would remind the committee, had recently been much enlarged and improved, so as to meet the increasing wants of the town and district; the wells were inexhaustible, and it could not be said that this would be an ineffective bill on any account. The learned counsel then referred to the provisions in the Acts of the metropolitan water-works companies, which compelled them to give a constant supply if required; but then, he said, there were clauses protecting them against waste, as people who required a constant supply were bound to have their taps and fittings in proper order. He also alluded to the restriction imposed by Lord Redesdale, limiting the dividend upon new capital to 7 per cent., and said that this arose in respect to some of the gas companies bills of the last few years. Those companies he need not remind the committee were authorized to make up to 10 per cent. upon the capital actually expended; but as they were in a flourishing condition it was thought they should issue new capital at 7 per cent., therefore Lord Redesdale said, "You shall not issue this new capital at 10 per cent., but at 7 per cent." In all those cases the old capital had always been taken as the capital which had been expended. The money laid out by Mr. Cutler had been expended to improve his works. They had to be rebuilt, as it were, from time to time, so that the money was not wasted, but had been expended in the most prudent manner possible. The learned gentleman concluded by earnestly asking the committee to pass the preamble of the bill.

The room was then cleared, and the committee consulted for upwards of half an hour. On the readmission of the public,

The CHAIRMAN said that the committee had decided to pass the preamble of the bill, subject to clauses to be inserted—first, that the value of Mr. Cutler's works should be ascertained by arbitration, and that the local boards of Windsor and Eton should have power to purchase them at such valuation within 18 months from the passing of the Act; and, further, that the profits to be paid on the present capital, as represented by the value, should not exceed the sum of £2200 in any year, subject to the clauses in the General Water-Works Act; and the committee reserved the question of profits to be allowed upon the new capital to be raised hereafter.

Mr. DENISON submitted that the committee could not give the petitioners any special power to purchase.

Mr. *Shrubsole* said that the promoters were perfectly content to bind themselves to sell the works, but he thought there was a technical objection in respect of the committee giving power to local authorities to purchase when no notice had been given.

The CHAIRMAN said that the committee intended that the works should be sold at a valuation, and they thought they could give power to the local authorities to purchase as they had suggested.

THURSDAY, MAY 21.

The clause embodying the decision of the committee gave rise to some discussion between Mr. WILL and Mr. SHRUBSOLE, and many technical objections were raised.

Ultimately the clause, as drawn up, was to the effect that an arbitration to determine the value of the works should be held within two months; that the local boards of Windsor and Eton should be allowed to purchase at the sum named by the arbitrators, provided they did so within 18 months; and that each party should pay their own costs.

The COMMITTEE explained that, whatever the amount was, the proprietors were to be restricted to profits not exceeding £2200 per annum. All questions—such as the goodwill and the lease, as well as the value of the plant—would be left to be determined by the arbitrator in the usual way.

Mr. WILL then proposed that the rate to be charged should not exceed 3½ per cent. for houses, with a deduction for shops.

The COMMITTEE said that they were agreed that the maximum should not exceed 4½ per cent.

The clause for relieving the company from giving a constant supply of water under high pressure raised a further discussion.

Mr. RICHARDS said that it was unreasonable to ask that Mr. Cutler should be bound to give a constant supply, because it would involve an additional outlay of £500 a year, and all to suit the views of a cheese-paring corporation, who, after binding Mr. Cutler down to a certain amount of profit, had the conscience to ask that he should give them something in addition, which would cost him at least £500 a year. It was unreasonable to ask for anything of the sort. If they were so very anxious for a constant supply under high pressure, they could buy the works and give it themselves. He did not hesitate to say that, if such a clause was inserted, without the committee allowed an increased rate in remuneration, it would be fatal to the bill.

The COMMITTEE decided upon allowing the clause to remain as proposed by the promoters.

Mr. WILL then asked for a clause stipulating that water for trade or public purposes should be supplied at 6d. per 1000 gallons.

Mr. RICHARDS said that such a clause would be perfectly preposterous.

The COMMITTEE declined to insert a clause, observing that the petitioners had ample security that the proprietors would not derive profits beyond a certain sum.

The remaining clauses were then disposed of *seriatim*, and the bill passed the committee.

Legal Intelligence.

ROLLS COURT.

TUESDAY, JULY 28.

(*Before the* MASTER OF THE ROLLS.)

THE GASLIGHT AND COKE COMPANY *v.* THE GREAT CENTRAL GAS CONSUMERS COMPANY.

This was a motion for an injunction to restrain the defendants from supplying gas to any part of the passengers or gooda stations of the London and North-Western Railway at Broad Street, which lie outside the boundary line of the City of London, or to any lamp or burner in, about, or belonging to the said stations or either of them situated outside the said boundary, or from selling gas to the said railway company for the purpose of lighting such parts of the said stations or any such lamps or burners. The plaintiffs contend that by the Metropolis Gas Act of 1860 the defendants are not entitled to supply gas beyond the limits of the City, and that by the acts complained of they have trenched upon the district within which, by the said Act, the plaintiffs alone are entitled to supply.

Mr. JESSEL and Mr. DAVEY appeared for the plaintiffs; Mr. SOUTHGATE and Mr. WICKINS for the defendants.

His LORDSHIP having intimated that there appeared to be considerable difficulty in dealing with the question on an interlocutory motion, and that the railway company, and not the defendants company, appeared to be liable to injunction, the motion stood over until the hearing of the cause after the long vacation.

VICE-CHANCELLOR'S COURT.

WEDNESDAY, JULY 29.

(*Before Sir* R. MALINS.)

THE ATTORNEY-GENERAL *v.* THE CAMBRIDGE GAS CONSUMERS COMPANY, LIMITED.

The Vice-Chancellor having given leave to amend the bill in this case at the hearing, and decided the various questions, and the bill having been amended,

Mr. COLE, Q.C. (with Mr. RIGBY), now moved to expunge certain of the amendments on the ground that they went beyond the order.

Mr. OSBORNE, Q.C., and Mr. C. LOCOCK WEBB opposed the motion, but, without hearing them,

The VICE-CHANCELLOR said that in this case a limited company, not being authorized by any parliamentary power, but (according to his honour's view) the commissioners of Cambridge having such power, such commissioners had given them the power they had, and when the bill was filed the defendants were therefore in possession of such power, but subsequently lost it by the rescinding of their contact. The decision was, therefore, in their favour up to that time, but they were wrong after such rescinding. He had given leave to amend the bill (following several authorities) by putting in issue that the defendants had no longer authority to break up the streets of Cambridge, and any matter arising thereout or connected therewith, and such facts and circumstances as might be necessary or proper for bringing them forward. Except a word here and there, the amendments were substantially correct, and the motion must be refused with costs.

The injunction was then moved for.

The VICE-CHANCELLOR made the order to restrain the defendants, their agents, &c., from breaking up the public ways of Cambridge.

HALIFAX BOROUGH COURT.

TUESDAY, JULY 28.

(*Before Mr.* J. T. HAIGH *and Mr.* G. B. BROWNE, *Magistrates.*)

THE CORPORATION OF HALIFAX *v.* FIRTH.

Mr. *John Firth*, manufacturer, of Lily Lane Mills, the defendant in this case, was charged as follows:—"That he, on or about the 4th day of December, 1867, did feloniously steal, take, and carry away 50,000 cubic feet of carburetted hydrogen gas, of the value of £10, the goods of the mayor, aldermen, and burgesses of the borough of Halifax, they being the owners of the gas-works undertaking within the borough." The case had previously occupied the attention of the bench, when Mr. Firth was fined, for six months illegal consumption of gas, about £330. Upon appeal at the last Bradford Quarter Sessions the conviction was quashed, as it was ruled that the Gas Clauses Act did not apply, as the illegal pipes had not been laid within the six months, the limitation of the Act. The corporation then decided to proceed against Mr. Firth for felony.

Mr. SHAW, barrister, instructed by the town-clerk, now appeared for the prosecution; and Mr. Serjeant TINDAL ATKINSON, instructed by Messrs. Wavell and Co., appeared for the defence.

The substance of the evidence against the defendant was as follows:—*James Helliwell*, an engine tenter, employed at Lily Lane Mill from 1842 to 1853, gave evidence that an illegal pipe was attached to the town's gas about 1850 or 1851. *William Jagger*, another engine tenter, said he had worked at the mill ten or eleven years. When he had been three or four years in Firth's employ, he and a man named Thomas Lee were ordered to remove the pipe, which was ¾-inch diameter, and replace it by a new one. The prisoner, and also his father, Mr. Samuel Firth, gave instructions with respect to the repairs. Some two years ago he (Jagger) helped to uncover the pipe, to take water out of a joint, because the lights in the boiler-house jumped. He had on many other occasions to do with the pipe. *George Watson*, plumber, stated that the prisoner superintended the mending of the pipe two years ago. *Thomas Hanson Scholefield*, sub-manager at the gas-works, upon information received, inspected Lily Lane Mill, laid bare the gas-pipes, and found that 80 lights in the mill were supplied otherwise than through the meter. Other witnesses were examined. The case occupied several hours, during which the court was crowded. The defendant was eventually committed to take his trial at the sessions. Bail was accepted, himself in £100 and two sureties in £50 each.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

REPORT TO THE COURT OF COMMON COUNCIL FROM THE SPECIAL GAS COMMITTEE.

To the Right Honourable the Lord Mayor, Aldermen, and Commons of the City of London in Common Council assembled.

We whose names are hereunto subscribed, of your Special Gas Committee, to whom, on the 19th day of September, 1867, it was referred by your honourable court to take such steps as your committee might deem necessary effectively to prosecute in the then ensuing session of Parliament a bill to confer on the corporation the power of supplying the City of London with gas, and to whom, on the 28th day of November last, was referred a petition to your honourable court of the delegates from several of the parishes of the metropolis, praying the assistance of the court to enable the delegates to prosecute a bill in Parliament relating to the supply of gas to the metropolis outside the City, and which bill was afterwards introduced into the House of Commons under the title of the Metropolis Gas Bill, and referred to your committee by your honourable court, who empowered your committee to present a petition to enable them to appear before the committee on the bill, to secure the insertion therein of proper clauses should the committee determine to pass the bill, and to whom, on the 23rd day of January last, were also referred the Gaslight and Coke Company Bill and the Metropolitan Gas Companies Amalgamation Bill, do certify that we directed the remembrancer to give the notices required by the Standing Orders of Parliament to enable us to introduce a bill conferring on the corporation the power of supplying the City with Gas, and we introduced such bill on the first night of the session.

We also rendered assistance to the delegates of the parishes of the metropolis, by which assistance they were able to introduce to the House of Commons the Metropolis Gas Bill.

The London Corporation Gas Bill, the Gaslight and Coke Company Bill, and the Metropolis Gas Bill were each read a second time and referred to the same committee. The Right Honourable Edward Cardwell was appointed the chairman of this committee, the other members being Mr. Hardy and Mr. Peel, who had served with Mr. Cardwell on the committee of 1867, and two new members, Mr. Holland and Mr. Green.

The committee decided that they would take the London Corporation Gas Bill before considering the other bills; your committee having suggested that the evidence in support of the Corporation Bill would (even if the bill were not passed) show what the illuminating power and price of gas ought to be in the City. Many petitions were presented against the bill by local authorities, public companies, and landowners, with all of whom however, excepting one landowner, the remembrancer and engineer were able to make satisfactory arrangements, so that substantially the only opposition to the bill was made by the gas companies.

Your committee were advised that neither of the gas companies except those supplying the City had a *locus standi* against the bill; but as all the objections to the bill might be urged by the City companies, your committee determined not to take any technical objection to the appearance of the other companies before the committee on the bill.

The companies were fully heard by their counsel, Mr. Denison, Mr. Hope Scott, and Mr. Davison, but the committee expressed their determination to pass the City Corporation Gas Bill, unless the companies consented to allow the committee to settle the clauses of the Metropolis Gas Bill upon the basis of the resolutions of the committee of last year, so as to make them, in the opinion of the committee, fair both to the companies and the gas consumers.

After much hesitation the three companies supplying the City with gas consented to submit to these terms, but the companies outside the City declined to do so. The committee, therefore, altered the preamble of the bill, confining it to the City, and changed the title from the "Metropolis Gas Act, 1868," to the "City of London Gas Act, 1868." Upon this all the gas companies, except the Chartered, the Great Central, and the City of London Gaslight and Coke Company, retired from the committee, who proceeded to settle the bill, which was afterwards read a third time, without opposition, in the House of Commons.

Notwithstanding the retirement of the metropolitan companies from the committee of the House of Commons, after that committee had confined the application of the bill to the City, nine of these companies appeared by petition before the committee of the House of Lords, to whom the bill was referred, to oppose the further progress of the bill. Their lordships, however, determined that these companies had no *locus standi* before them, and the bill then became unopposed, and was read a third time in the House of Lords as it had been settled by the committee of the Commons, with the exception of some verbal amendments. The bill has since received the Royal Assent.

The committee of the House of Commons from time to time postponed their decision on the bill promoted by your committee, it being the understanding of all parties that if the City of London Gas Bill were passed the Corporation Gas Bill was not to proceed. Your committee have, therefore, now withdrawn the London Corporation Gas Bill.

The Metropolitan Gas Companies Amalgamation Bill did not, owing to the disagreements among the companies, proceed to a second reading.

The remembrancer laid before us a copy of the Gaslight and Coke Company's bill, which on examination was found to contain the objectionable clause for capitalizing £360,000, in respect of alleged divisible profits expended by the company for the purpose for which capital is applicable, and which had been twice before rejected by committees of the House of Commons.

When the Gaslight and Coke Company assented to the committee of the House of Commons settling the Metropolis Gas Bill as the committee might consider fair between the company and the consumers of gas, the committee intimated that they would favourably consider the Gaslight and Coke Company's bill, which they accordingly proceeded to do after passing the City of London Gas Bill.

Your committee again successfully opposed the capitalization of the £360,000, and obtained the insertion in the bill of clauses for the protection of the streets and sewers of the City.

The works to be established by the bill are to be situate on the north bank of the Thames, in the parishes of Barking and Woolwich, near to a site which your committee had selected for the works of the corporation. Power is given in the bill for the City of London Gaslight and Coke Company to subscribe a sum of £150,000 towards the capital of the Chartered Company, and to receive a supply of gas from that company.

The bill has passed the Houses of Parliament and received the Royal Assent, and your committee trust that the powers conferred by it, combined with the determination of the Metropolitan Board of Works to construct a solid embankment at Blackfriars, will ultimately lead to the removal of the City of London Gaslight and Coke Company's works from the neighbourhood of the Temple, an object which the corporation have for the benefit of the citizens long endeavoured to accomplish.

Your committee now proceed shortly to review their labours by which they have, under various references from your honourable court, endeavoured to secure cheap and good gas for the citizens.

We do not propose to enumerate the various clauses of the City of London Gas Act, of which a copy will be sent to every member of the court, but we will mention some of the principal advantages which we have been able to secure.

When your committee were first appointed in October, 1865, the supply of gas was regulated by the Metropolis Gas Act, 1860.

Under that Act the illuminating power of common gas was 12 candles, and the price 4s. 6d. per 1000 cubic feet. The price of gas is now 4s. per 1000 cubic feet for gas of an illuminating power of 14 candles. On the 1st of January, 1870, the illuminating power is to be 16 candles, and the price is to be reduced to 3s. 9d. per 1000 feet.

The price of cannel gas, defined to be gas of 20 candles illuminating power, was, under the Act of 1860, 7s. 6d. per 1000 cubic feet. Under the new Act, until the 1st of January, 1870, the price is reduced to 5s. 6d., and after that time it is to be sold at such a rate per 1000 cubic feet as for gas of the illuminating power supplied will be proportional to the price of 3s. 9d. per 1000 cubic feet for 16-candle gas.

There are provisions in the Act under which the price of gas and its illuminating power may, after the 1st of January, 1870, from time to time be further diminished or increased, but the price is never to be higher, nor the illuminating power lower, than under the Act of 1860; and your committee feel confident that, if any change be made, it will be by way of reduction in the price.

If an application be made by the companies for a revision of the illuminating power or price of gas, and the application be unsuccessful, the companies are to pay the costs of the application out of the sum applicable to dividends; but if the application be successful the costs are to be chargeable to expenses of management.

If the corporation apply for such revision, and fail to obtain any alteration of price or illuminating power, the corporation are to pay the costs; but if their application be successful the companies are to pay the costs out of the fund applicable to dividends.

The Act contains powers for the corporation to purchase by agreement the works of the City companies, provided the power is exercised within three years after the passing of the Act.

The companies may by the Act propose a scheme for their amalgamation, and submit the same to the Board of Trade, who are to consider any representations that the corporation may make respecting the same, and then the board may suggest modification of the scheme.

If the scheme, whether modified or not, is confirmed by Her Majesty in council, it is to have the force of an Act of Parliament.

If an amalgamation be not carried out, still the consumers of gas are, in any revision of the price of gas, to have the advantage of any saving or economy which might have been effected by an amalgamation.

Payment of back dividends is not to be permitted.

The reserved fund allowed under the old law is abolished, and in its place a new fund, called an insurance-fund, is to be created when the dividends reach 10 per cent., but it is only to be to the extent of one-half the old reserved fund, and by additions only of 1 per cent. per annum; and instead of being applicable, as the old reserved fund was, to payment of back dividends, it is to be confined to meeting any extraordinary claims or demands which may arise against the companies from accidents which due prudence and management could not have prevented.

One of the most difficult subjects in gas legislation has been how to define a burner by which the illuminating power of gas is to be determined, and all such definitions have hitherto resulted in advantage to the gas companies. This difficulty has been successfully met in the new Act.

The Board of Trade are to appoint referees, who are from time to time to prescribe the mode to be adopted for testing and recording the illuminating power of the gas. The only limitations upon the discretion of the referees in this respect are that the burner is to be such as shall be most suitable for obtaining from the gas the greatest amount of light, and be practicable for use by the consumer. These referees are to be vested with extensive powers, under which they will have access to the works of the companies. They can investigate the process of manufacture; they can test at the works or elsewhere for ascertaining the amount of sulphur and ammonia and the compounds thereof or other impurity with which gas is charged, and they are to prescribe and certify the amount of impurity in each form with which gas shall be allowed to be charged.

The power conferred on the Commissioners of Sewers by the Act of 1860, of electing to pay for the supply to the public lamps by meter, was found useless, as the companies would not consent to take the average of a number of lamps, but insisted that a meter should be fixed to each lamp. The expense of this plan was a bar to its adoption.

Amongst the powers given to the referees in the present Act is the important one of prescribing and certifying the mode of ascertaining the quantity of gas consumed by the public lamps, if required by either party.

The corporation are to appoint a gas examiner or gas examiners to test the illuminating power and purity of the gas, and the reports of the examiner are to be conclusive against the companies, unless reversed on appeal by the chief gas engineer, who is to be appointed by the Board of Trade.

The various obligations of the companies are enforced by sufficient penalties.

Under the Act of 1860 it was almost impossible to recover any penalty incurred by a company; and if it were recovered, as it was paid out of the general expenses of the company, it really was paid by the consumer. This unjust absurdity is guarded against under the new Act, as every forfeiture is to be paid exclusively out of the divisible profits of the company by whom the forfeiture is incurred and by way of reduction of dividend.

The last improvement in the law which your committee consider it necessary to particularize is one of great importance.

There is to be an auditor of the accounts of the companies, a competent and impartial person, from time to time appointed and removeable by the Board of Trade.

The auditor is to investigate the accounts of the companies, and to ascertain and certify the amount of their capitals, distinguishing share from loan capital; and particularly he is to ascertain how much of the capital of the Chartered Company is to be apportioned to their district within the City.

He is also to prescribe the form of accounts to be kept by the companies, and, what is most important, if in any instance he finds the accounts incorrect in principle or detail, he is to require the same to be corrected, and no dividend is to be declared until the amounts are certified by him.

These great powers are properly subject to an appeal to an arbitrator.

The cost of the gas referees, of the chief gas examiner, and of the auditor are to be paid by the companies, as allowed by the Board of Trade, and the cost of the gas examiners is to be paid by the Commissioners of Sewers.

Your committee congratulate the court on the satisfactory termination of the contest in which we have been engaged during three sessions of Parliament. In this contest your committee had to contend, not merely with the City gas companies, but with the combined parliamentary power of the gas interest of the whole country. Your committee believe that the result of their labours will be to secure for the gas consumers of the City an abundant supply of gas of a high illuminating power, and at a moderate price; and that a question which has long been a subject of great interest to the citizens has at length received a satisfactory solution.

Your committee have also the satisfaction to state that, so far as concerns the district lighted by the Chartered Gas Company outside the City, similar advantages, in all respects, are by the legislation of this session secured to that district.

In conclusion, we have to state that, as the Act comes into operation at once, it will be necessary for your honourable court to determine forthwith as to the appointment of a gas examiner or examiners, and we recommend that it should be referred to us to consider and report to you on the subject, conferring, if necessary, with the Commissioners of Sewers.

All which is respectfully submitted to the judgment of this honourable court. Dated this 13th day of July, 1868.

(Signed) J. F. Bontems, and others.

Metropolitan Board of Works—Friday, July 31.

At the Meeting of the Board this day, at the Offices, Spring Gardens—Sir J. Thwaites in the chair,

Mr. Shaw said the vestry of the parish of St. Marylebone, which he represented, very much disapproved of the course which they believed the board intended to take with reference to the purchase of the various gas-works of the metropolis, and he was instructed to lay their views before the board.

The Chairman said the question was not then ready for discussion.

Mr. Shaw said it was reported that a decision had been come to by the Gas Committee, and he wished to move a resolution to the effect that, on the eve of an adjournment, it was not desirable for the board to take up so important a question.

The Chairman said he understood that upon the rising of the board that day the committee would meet and take this question into consideration. If they arrived at any conclusion upon it, they would bring up a report on the following Friday.

Mr. Shaw said that was the very thing he desired to avoid. It seemed to him that it was on every consideration undesirable that a conclusion affecting the expenditure of millions of the ratepayers money should be come to by a committee of the whole board on the eve of an adjournment for the holidays.

Mr. Newton said there was no evidence of an intention of the sort.

The Chairman said the time for the honourable member for Marylebone to submit any motion would be when the committee brought up a report.

Mr. Shaw said he would at once give notice of the following motion:—"That this board, now upon the eve of adjourning, should not consider the important matter of purchasing the interests of the metropolitan gas companies, and of undertaking the manufacture of gas for the use of the public until after notice of such intention has been duly given, and that the Gas Committee's report on this subject be not received until after the autumn vacation."

Average Composition and Quality of the Metropolitan Waters in July, 1868.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

Names of Water Companies.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Comps.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	16·83	0·064	0·075	0·000	12·0	2·5
West Middlesex	15·30	0·047	0·024	0·000	11·5	2·5
Southwark and Vauxhall	16·85	0·055	0·030	0·001	12·0	2·5
Chelsea	18·16	0·064	0·103	0·001	12·0	2·5
Lambeth	17·17	0·047	0·083	0·002	11·5	2·5
Other Companies.						
Kent	27·16	0·018	0·075	0·000	17·5	6·5
New River	16·67	0·042	0·052	0·000	12·0	2·5
East London	16·50	0·042	0·015	0·001	12·0	2·5

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and, in the case of the metropolitan waters, the quantity of organic matter is about eight times the amount of oxygen required by it.

H. Letheby, M.B.

Dr. Frankland's Analysis of the Metropolitan Waters in July, 1868.—"Royal College of Chemistry, July 24, 1868.—Sir,—I have the honour to submit to you in the following table the results of the chemical examination of the waters supplied to the metropolis during the month of July. For the purpose of comparison I append also the results yielded by Loch Katrine water, as supplied to Glasgow, and by the waters supplied to the towns of Lancaster, Manchester, Leicester, Preston, and Worthing, when submitted to the same analytical processes. The river waters supplied to London again exhibit an exceptional degree of purity as regards solid matter, hardness, and previous sewage contamination; but the proportion of organic nitrogen, representing chiefly unoxidized animal impurities, is nearly as great as usual, showing that the accelerated oxidation of the organic impurities, owing to the high temperature, is nearly compensated by the diminished volume of water with which the sewage and manure matters commingle in the Thames and Lea. The temperature of the Thames at Greenwich, on the 9th inst., when most of the samples were drawn for analysis, ranged from 18·6° to 19·3° Cent. On reference to the following analytical table, it will be seen that this high temperature is not lowered by transmission through the street-mains. The deep well water of the Kent Company has now a considerable advantage over the river waters in regard to coolness, its temperature being from 2·5° to 5·2° Cent. lower than that of the latter. It is to be regretted, however, that this advantage is lost, owing to the intermittent system of supply. The waters delivered by the Grand Junction, Lambeth, and East London Companies were very slightly turbid; the rest of the samples were clear and transparent when drawn from the companies mains.

Companies.	Date and Place of Collection.	Temperature in Cent. Degrees.	Total Solid Impurity in 100,000 Parts.	Organic Carbon.	Organic Nitrogen.	Nitrogen, as Nitrates and Nitrites.	Ammonia.	Total combined Nitrogen.	Previous Sewage Contamination (Estimated).	Total Hardness.
Thames.	Temp. of Thames—July	Cent. 19·0								
Chelsea	July 9—Cab Rank, Horse Guards	18·9	23·0	·142	·025	·067	·002	·096	370	17·4
West Middlesex	July 9—Cab Rank, Portland Road	21·1	22·6	·129	·023	·041	·002	·070	110	16·4
Southwark & Vauxhall	July 9—Barclay's Brewery	21·6	23·8	·128	·026	·046	·001	·074	150	18·2
Grand Junction	July 13—College of Chemistry	20·0	23·0	·136	·024	·066	·001	·092	350	17·5
Lambeth	July 9—Cab Rank, Lambeth Road	19·4	24·2	·108	·027	·109	·001	·138	780	17·5
Other Sources										
New River	July 9—Cab Rank, Tottenham Ct. Rd.	19·7	23·6	·059	·020	·045	·001	·067	140	18·2
East London	July 9—Slater's, Old Ford Road	19·4	21·2	·092	·023	·000	·001	·025	0	16·2
Kent	July 13—Deptford Edge. Police Stat.	16·4	40·2	·022	·009	·398	·000	·407	3660	26·2
Loch Katrine	July, 1867, Glasgow		3·0	·161	·011	·000	·001	·012	0	0·3
Lancaster	Sept.—Lancaster		3·54	·157	·001	·036	·001	·038	50	0·1
Manchester	June—Manchester		6·2	·183	·009	·025	·006	·039	0	3·7
Leicester	Nov.—Leicester		23·7	·506	·020	·001	·001	·022	0	13·4
Preston	Dec.—Preston		14·7	·515	·040	·001	·003	·044	0	6·7
Worthing	Nov.—Worthing		36·7	·162	·000	·426	·000	·426	3940	23·8
Column 1	2	3	4	5	6	7	8	9	10	11

The numbers in columns 4, 5, 6, 7, 8, 9, 10, and 11 all relate to 100,000 parts of the waters. The table is to be read thus: The Chelsea Company's water collected on July 9, at the Horse Guards cab rank, had a temperature of 18·9° Cent.; 100,000 lbs. of it contained 23 lbs. of solid impurity; the organic matter, constituting a portion of this impurity, contained ·142 lb. of carbon and ·025 lb. of nitrogen. This solid impurity also contained ·067 lb. of nitrogen in the form of nitrates and nitrites, besides ·002 lb. of ammonia; whilst the total amount of *combined* nitrogen in every form was ·096 lb. The above quantity of water supplied by the Chelsea Company had been, after its descent to the earth as rain, contaminated with sewage or manure matter equivalent to 370 lbs. of average filtered London sewage. By gradual oxidation, partly in the pores of the soil, partly in the Thames and its tributaries, and partly in the reservoirs, filters, and conduits of the company, this sewage contamination had been converted into innocuous inorganic compounds before its delivery to consumers. Finally, 100,000 lbs. of the Chelsea Company's water contained 17·4 lbs. of carbonate of lime, or an equivalent quantity of other soap-destroying ingredients.—I have, &c., E. Frankland.—The Registrar-General, &c."

Strike at the Philadelphia Gas-Works.—By the strike of the workmen employed by the gas authorities of Philadelphia, that city has been left during two nights in darkness. The newspaper offices and other buildings have been lighted by candles and old-fashioned lamps, the *Inquirer* office alone getting its light from a patent gas-machine.

Alarming Occurrence at the Chartered Gas-Works.—On Wednesday last, at a few minutes before midnight, the greatest alarm was caused at the West-end, and also in the City, arising from a vast body of flame which shot up a considerable distance into the air, and completely illuminated the metropolis for several minutes. This caused a general turn-out of the engines of the Metropolitan Brigade, the firemen being guided only by the reflection in the sky. At length some of the engines reached the scene of danger, which was the Chartered Gas-Works, in Vincent Street, Westminster. It appears that a quantity of gas had escaped from the cup of one of the large gasholders, and becoming ignited from the furnace of a portable engine that was pumping water in the vicinity, sent forth the flames so high as to be seen all over London. At first it was feared that the gasholder would have exploded, for the flames played round it so fiercely that it was apprehended some of the iron plates would warp and let the atmospheric air into the holder. Fortunately such was not the case. All hands were immediately summoned together, and they did all that was possible to fill up the lute and prevent any further escape of gas, but whilst the men were so engaged the rope-ladder leading from the bottom of the gasometer to the top caught fire, and was quickly destroyed. By great perseverance on the part of all present the further escape of gas was stopped,

and no further loss occurred. Captain Shaw describes the damage done as follows:—"Chartered Gas-Works, Vincent Street, Westminster. A quantity of gas destroyed, rope-ladder burned, and gasholder damaged by fire. Cause of fire—gas escaping from the lute of the gasholder and coming in contact with the furnace fire." The cup had not been immersed in the tank for some days, and it is presumed the excessive heat of the weather had caused an unusual evaporation, by which the lute became unsealed and permitted the gas to escape.

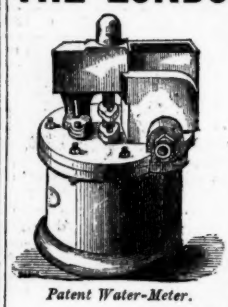
Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Price per Share.
	£		£ s. d.	£ s. d.	£
8000	10	Anglo-Romano	10 0 0	10 0 0	11 — 12
5000	20	Bahia (Limited)	20 0 0	3 0 0	14 — 15
1000	20	Do., preference	20 0 0	10 0 0	20 — 22
750	20	Do., do., redeemable	10 0 0	10 0 0	12 — 12½
40000	5	Bombay (Limited)	5 0 0	4 10 0	4 — 4⅛
10000	5	Do., third issue	3 0 0	4 10 0	2 — 2⅛
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge, & Holywell.)	20 0 0	10 0 0	28 — 29
12000	50	*Chartered*	50 0 0	7 0 0	49 — 50
6000	50	Do.	45 0 0	7 0 0	43 — 44
10000	20	*City of London*, A shares	20 0 0	9 0 0	22 — 24
10000	10	Do., B shares	10 0 0	4 0 0	6 — 6¼
9629	10	Do., new shares	10 0 0	9 0 0	11 — 12
25000	25	City of Moscow (Limited)	25 0 0	nil.	5¼ — 6¼
17490	25	*Commercial*	25 0 0*	10 0 0	34 — 36
20000	20	Continental Union	20 0 0	4 0 0	14½ — 15½
10000	20	Do., preference	20 0 0	7 0 0	20 — 20¼
5000	10	*Crystal Palace District*	10 0 0	10 0 0	13½ — 14
5000	10	Do., preference	10 0 0	6 0 0	12½ — 13
10000	10	Do., new shares	2 10 0	7 0 0	2½ — 3
4000	50	*Equitable*	50 0 0	10 0 0	65 — 67
4000	25	Do., new shares	25 0 0	10 0 0	32½ — 33½
23406	10	European (Limited)	10 0 0	11 0 0	15 — 15½
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	11 0 0	7 — 7¼
20000	10	*Great Central Gas Consumers*	10 0 0	10 0 0	13 — 13⅛
5000	10	Hong Kong (Limited)	10 0 0	5 0 0	8 — 10
26000	50	*Imperial*	50 0 0	10 0 0	63 — 65
26000	10	Do., new shares	1 0 0	10 0 0	1⅛ — 1⅜
26000	12½	Do., new shares	3 0 0	7 0 0	3 — 3⅛
1300	100	Do., bonds	£100	10 0 0	170 —175
28000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	16 0 0	100 —100½

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Price per Share.
	£		£ s. d.	£ s. d.	£
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	52 — 53
3000	10	Do.	10 0 0	5 0 0	7 — 9
3000	20	Do.	12 10 0	7 10 0	13 — 14
7133	50	*London*	50 0 0	10 0 0	64½ — 65
5610	25	Do., 1st preference	25 0 0	6 0 0	26 — 27
503	50	Do., 2nd preference	50 0 0	6 0 0	
214	50	Do., 3rd preference	50 0 0	6 0 0	
£18751		Do., 1st preference stock		6 0 0	
£11828		Do., 2nd preference stock		5 0 0	
12000	5	Malta and Mediterranean (Limited)	5 0 0	5 0 0	3¼ — 4
6000	5	Do., preference	5 0 0	7 0 0	— 5
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	6⅞ — 7¼
30000	5	Do., new shares	1 0 0	9 0 0	1¼ — 1⅜
10000	5	Ottoman (Limited)	5 0 0	nil.	1⅞ — 2¼
10000	10	Pará (Limited)	10 0 0	6 0 0	8¼ — 9
27000	20	*Phœniz*	20 0 0	10 0 0	28 — 29
3600	100	Do., new	35 0 0	7 10 0	36 — 37
144000	8s.	Do.	100 0 0	5 0 0	72 — 74
5000	20	*Ratcliff*	20 0 0	10 0 0	23 — 24
	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	23 — 25
6959	5	Singapore (Limited)	5 0 0	4 0 0	
2000	5	Do., preference	5 0 0	7 10 0	
		Shanghai			
4800	50	*South Metropolitan*	50 0 0	10 0 0	70 — 72
	12½	Do., new shares	12 10 0	10 0 0	17¼ — 18
15000	10	*Surrey Consumers*	10 0 0	10 0 0	13 — 13¼
10000	10	Do., new	6 0 0	10 0 0	8 — 8½
9000	5	United General (Limerick)	5 0 0		2 — 2½
10000	10	*Victoria Docks*	5 0 0	6 0 0	
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	10 — 12
2989	10	Do.	10 0 0	7 10 0	10 — 10¼
316	10	Do.	6 10 0	7 10 0	
1128	10	Do.	3 0 0	7 10 0	
20000	10	Western (Limited) A shares	10 0 0	10 0 0	14 — 14½
10000	10	Do., B shares	6 0 0	10 0 0	8 — 8½
10000	10	Do., C shares	6 0 0	10 0 0	8 — 8½
20000	10	Do., D shares	1 0 0	10 0 0	1½ — 2
8000	5	*West Ham*	5 0 0	7 10 0	.. — 7⅛
6000	5	Do., new shares	5 0 0	7 10 0	.. — 7¼
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

Advertisements.

THE LONDON & WESTMINSTER METER COMPANY, LIMITED.



Patent Water-Meter.

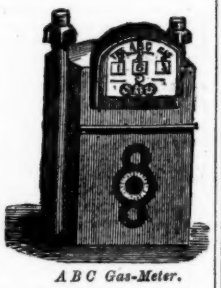
(SUCCESSORS to THOS. EDGE, Jr., & CO.)

PATENTEES AND SOLE MANUFACTURERS OF

THE ABC GAS-METER.

EDGE'S PATENT INDEX.

PATENT WATER-METER (a Cylinder and Piston).



ABC Gas-Meter.

The ABC GAS-METER shows in plain figures the money payable for Gas consumed, as well as the number of cubic feet.

The WATER-METER is accurate in measurement, simple in action, and moderate in price.

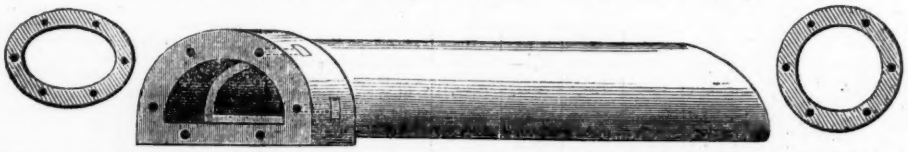
Manufacturers of the ordinary Wet and Dry Meters, Governors, Photometers, and all other Gas and Water Apparatus.

JOHNSON'S PLACE, LUPUS STREET, LONDON, S.W.

CITY OFFICE: 2, CASTLE COURT, BIRCHIN LANE, E.C.

THE FARNLEY IRON COMPANY,

FARNLEY, near LEEDS,



In consequence of the increasing demand for their Retorts, have largely extended this branch of their Fire-Clay Works, and are now prepared to execute the most important orders, either for *home* or *export*, with great punctuality.

The Fire-Clay raised from the Farnley Estate (commonly called the Wortley bed) is unsurpassed by any other known in the district, and is peculiarly well adapted for Retorts, Gas-Ovens, and Fire-Bricks; and the F. I. Co. beg especially to invite those connected with Gas-Works, who have not yet used their Retorts, to be good enough to favour them with a trial.

The F. I. Co. generally hold in stock, for immediate supply, Fire-Bricks of every size and kind—Tiles, Sanitary Tubes, Ornamental Terra-Cotta Ware White Facing Bricks, the White, Buff and Salt-Glazed Bricks, &c., &c.

Prices, Drawings, and all other information may be obtained by applying as above, or to

MR. SUTTON, THE HULL STORES, 46½, QUEEN STREET, HULL.

BAHIA GAS COMPANY.

WANTED, a Deputy Manager and Book-keeper. He must be practically acquainted with gas-making, so as to be qualified to take entire charge of the works in case of necessity, and must be able to manage the book-keeping as far as respects stores, rental accounts, and returns of working. A knowledge of Portuguese, Spanish, or French is desirable.

Applications, with testimonials, to be made to the undersigned. ARTHUR CLARKE, Secretary.

Bahia Gas Company, 76, Coleman Street, London, July 24, 1868.

PETERBOROUGH GAS-WORKS.

WANTED, by the Peterborough Gas Company, a Resident MANAGER and ENGINEER of the Company's Works. He will be required to keep the books, and to enter upon his duties early in September next. The Manager will have to find his own house and coals, but gas will be allowed.

Apply, with testimonials, and stating salary required, to Mr. RUTLAND, the Secretary of the Company, No. 4, Priestgate, PETERBOROUGH.

WANTED, a situation to make and erect Gasholders, Roofs, Tanks, and Works complete.

Address DELTA, Post-Office, West Bromwich, STAFFORDSHIRE.

TO GAS-FITTERS.

WANTED, immediately, a respect- able, steady, sober man as Gas-Fitter and Meter Inspector. He will be required to lay mains and services, and must be able to do the whole of the smith's work required on the works.

Applications, in own handwriting, stating age and wages required, accompanied with testimonials, to be sent to J. B. BALL, Manager, Gas-Works, YEOVIL.

TO GAS COMPANIES.

WANTED, a situation as Manager or Foreman of a gas-work, or as Inspector, or to repair and alter meters to meet the requirements of Sale of Gas Act. Has had 18 years experience, and can be well recommended. No objection to go abroad.

Address HENRY BOULTON, 24, Railway Street, Newport, MONMOUTHSHIRE.

WANTED, by the Advertiser, a situation as WORKING MANAGER to a gas-work. First-class testimonials.

Address F. S. B., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE, an Hydraulic Centre- VALVE for 4 purifiers, with 3½-in. connexions, complete. Also 2 Slate Purifiers, 5 ft. by 2½ ft. within, with wrought-iron lids, together with several 3 and 4 in. cast-iron bends and elbows. The whole in excellent condition, will be sold cheap, and are suitable for a small work.

Apply Camborne Gas Company, CORNWALL.

TO GASHOLDER MAKERS.

FOR SALE, a Gasholder Plate Punching Machine, to pierce 49 holes at one time, at GEORGE CUTLER'S, Mildmay Yard, Newington Green Road, LONDON, N.

ON SALE, a Vertical High-Pressure STEAM-ENGINE and GAS EXHAUSTER, capable of passing from 1000 to 15,000 cubic feet per hour, with feed-pump, delivery-pipes, valves, &c., all complete. This having become too small for present use, is being replaced by a larger one. Made by Messrs. John Musgrave and Sons, Bolton.

Application to be made to the MANAGER, Farnworth and Kearsley Gas-Works, near BOLTON.

CROYDON COMMERCIAL GAS AND COKE COMPANY.

TO BE SOLD, in consequence of the completion of the Company's New Works—

2 Burton and Co.'s VERTICAL ENGINES, 5-horse nominal power; and 2 of Beales' EXHAUSTERS for 10,000 ft. each per hour.

A Telescope GASHOLDER, 40 ft. diameter, with columns, girders, carriages, inlet and outlet pipes, valves, &c., &c.

A cast-iron TANK, 30 ft. diameter, 15 ft. deep, with columns, inlet and outlet pipes, valves, &c.

A CONDENSER-BOX, 24 ft. by 6 ft. by 3 ft. 6 in., with twenty-eight 8-in. pipes, &c., &c., complete.

A STATION-METER, to pass 5000 feet per hour, with connexions, &c., complete.

A GOVERNOR, complete, with delivery-box, 3 valves, and connexions complete.

Retorts and other Castings, Valves, &c.

Applications to be made to the Secretary, at the Offices, 23, George Street, CROYDON.

WILLIAM PURVIS, Secretary.

HALIFAX CORPORATION GAS-WORKS.

TO GASHOLDER MAKERS & IRONFOUNDERS.

THE Halifax Corporation are pre- pared to receive TENDERS for the construction of a Telescopic GASHOLDER, at Whitegate, within the borough of Halifax. The inner Gasholder will be 137 ft. in diameter, and the outer Gasholder 140 ft. in diameter.

The drawings may be seen, and copies of the specifications and form of tender obtained, on payment of one guinea, on application at my Offices, in the Town Hall, Halifax; and tenders, endorsed "Tender for Gasholder," must be sent to me on or before Thursday, the 27th day of August next.—By order,

J. E. NORRIS, Town-Clerk.

Town Hall, Halifax, July 25, 1868.

THE EARL SHILTON GASLIGHT & COKE COMPANY, LIMITED.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 1500 yards of Spigot and Socket Cast-Iron 4-in. MAIN PIPING, at per ton, to weigh 52 lbs. per yard; 1070 3-in. ditto, to weigh 33 lbs. per yard; 1790 ditto, 2-in., to weigh 22 lbs. per yard, separate; and also as much ¾-in., ¾-in., and 1-in. Service-Pipe as may be required by the Company, separate.

The tenders for excavating, joining of the mains with lead, and filling up same, to be given in separate from the above; also the excavating for and putting in services-pipes, breaking through walls, and making good the same, to be a separate item; and for other necessary materials which may be required for conveying the gas from Earl Shilton to Barwell.

The specifications can be seen, and other information obtained, at the Offices of the Company, Wood Street, Earl Shilton, near Hinckley.

The Pipes, &c., must be delivered, carriage paid, to the Elmsthorpe Station. Sealed Tenders to be sent to the Office before or on the morning of the 11th day of August, 1868.

The Directors do not bind themselves to accept the lowest or any tender.—By order,

F. ROWE, Secretary.

July 22, 1868.

TO EXPORTERS OF GAS COAL.

THE PATENT GAS COAL yields 13,800 feet of 32-candle gas, saves 33 per cent. in lime purification, and yields a good coke. Shipped, f.o.b., Rotterdam, at 23s. per ton.

Apply to HAMILTON, DULLENS, and Co., DORDRECHT, Patentees for England, France, Holland, Denmark, and Germany; or to their London Agents, WARNER, WALDUCK, and Co., 11, OLD JEWRY CHAMBERS.

TO GAS COMPANIES.

WESTPHALIAN GAS COAL, yielding 10,000 cubic feet of 18-candle gas, and good COKE, can be supplied at 19s. per ton, ex ship in Thames, by WARNER, WALDUCK, and Co., 11, OLD JEWRY CHAMBERS, E.C., Sole Agents in England.

TOWYN, MERIONETHSHIRE.

MR. LEWIS WILLIAMS has been appointed by the Master of the Rolls to SELL BY AUCTION, at the Corbet Arms Hotel, at Towyn, in the county of Merioneth, on FRIDAY, the 14th day of August, 1868, at Three o'clock in the afternoon precisely, in One Lot, pursuant to an order of the High Court of Chancery, made in the matter of the Companies Act, 1862, and of the Towyn Gas Lighting and Coal and Coke Company, Limited, the GAS-WORKS of the Towyn Gas Lighting and Coal and Coke Company, Limited, and the FREEHOLD SITE thereof, with the whole of the Buildings, Apparatus, Machinery, Fixtures, Tools, Implements, Mains, Services, Meters, Lamp-Posts, and Fittings, erected or laid, belonging to the said gas-works.

Printed particulars may be had gratis of Mr. WILLIAM ROBERT WILLIAMS (the Official Liquidator), Springfield House, Dolgelly, Merionethshire; Mr. CHARLES WILKIN, Solicitor, 10, Tokenhouse Yard, London; at the Corbet Arms, Towyn; and at the principal Hotels at Dolgelly, Barmouth, and neighbourhood; and of Mr. LEWIS WILLIAMS, the Auctioneer, Dolgelly.

NOTICE.

Suffolk Street, Clerkenwell Green, London, June 24, 1868.

As sole Executrix of the late Mr. Thomas Glover, permit me to inform you that I have taken into Partnership his brother, Mr. John Glover, who for upwards of 20 years has had the sole management of the Manufacturing Department, and I have secured the services of the same efficient staff of skilled workmen who have for so many years been connected with the Establishment, which I trust will be a sufficient guarantee that the article manufactured will maintain its well-known high character.

All orders that you may be pleased to forward shall receive the same prompt and careful attention as heretofore.

The business will be conducted under the style and title of "Thomas Glover & Co.," and will shortly be carried on at the extensive new factory erected by the late Mr. Glover, in St. John Street, Clerkenwell Green, which his enlarged business rendered requisite.

I am, yours truly,

AGNES R. GLOVER.

Referring to the annexed letter, I beg to say I have entered into Partnership with Mrs. Glover, the widow of my late brother, and respectfully solicit a continuance of your esteemed orders, which shall at all times command my best attention.

Yours respectfully,

JOHN GLOVER.

POPE & PEARSON'S Gas Coal.—We beg to call the attention of all Gas Companies to this important winning, at a depth of 1275 feet. The yield of gas is more than 10,000 cubic feet per ton, with an illuminating power of 20 spermaceti candles, producing 12½ cwt. of coke per ton. The Coals are now being used by the Gas Companies in London. One Engineer, after trial, gives the following results:—

10,000	cubic feet per ton, and	19·13	candles.
11,468	"	16·57	"
12,000	"	15·42	"
13,260	"	15·00	"

This valuable Coal can be delivered in London within 1s. per ton of the ordinary Newcastle Gas Coal; can be shipped at the ports of Hull and Goole, or by railway to any station.

For further particulars, apply to POPE AND PEARSON, West Riding and Silkstone Collieries, near Leeds, YORKSHIRE.

PERFECT WATER DISTRIBUTOR.

TO THE EDITOR OF THE "JOURNAL OF GAS LIGHTING."

Pioneer Iron-Works, Accrington, June 22, 1868.

DEAR SIR,—We have constructed a self-moving Water Distributor for Scrubber use, which for simplicity, durability, and efficiency cannot be improved, and we should be glad to supply it to any of your readers with a guarantee that its working gives every satisfaction.

Yours truly,

PETER EDDLESTON & Co.

[COPY TESTIMONIAL.]

Gas and Water Works, Accrington, June 20, 1868.

GENTLEMEN,—I have great pleasure in bearing testimony to the very efficient, simple, and durable self-moving Water Distributor that you have fixed in the Scrubber at these works, and I have not the slightest hesitation in saying that its working will give entire satisfaction to the purchaser.

I am, Gentlemen, yours truly,

ROBERT IDDON,
Secretary and Manager.

Messrs. Peter Eddleston & Co.,
Pioneer Iron-Works, Accrington.

FOR SALE.

THE Kettering Gaslight and Coke Company offer a STATION-METER, to pass 2000 feet of gas per hour, and a GOVERNOR, to pass 5000 feet of gas per hour, both in good working order. Made by Parkinson and Co. in 1858, and removed only to be replaced by larger ones.

For further particulars, apply to GEORGE GILL, Manager of the Kettering Works.

Kettering, July 14, 1868.

CATHELS'S Patent Dry District GOVERNOR is the only perfect self-acting contrivance for regulating the pressures in the higher levels of a district.

CATHELS'S Patent Four-way Disc GAS-VALVE—ONE OF WHICH SERVES AS THREE ORDINARY VALVES—is the best Valve for gas-works.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS'S Patent Ribbed Gas Main- PIPES cost but about 1d. to 2d. per yard (depending on the size) more than Plain Pipes, and ensure PERFECT GAS-TIGHT CONNEXIONS with the Service-Pipes.

Apply to Messrs. BEGGS & SON, 37, Southampton Street, Strand, LONDON.

TESTIMONIAL.

Abingdon Gaslight and Coke Company, Limited, Offices and Works, Thames Street, June 25, 1868.

MR. E. S. CATHELS.

Sir,—We have recently relaid a great portion of our town with your Patent Pipe, and I have much pleasure in bearing testimony to its merits. I find from our fitters that there is not the tendency to split when large services are put in that we find in the ordinary pipe of the smaller sizes, and, from having a greater thickness to drill and tap into, there is less liability to leakage at the connexion.

I am, sir, yours respectfully,

JOHN TOMKINS, Chairman.

CANNEL COAL.

MESSRS. GRIFFITHS BROTHERS, COPPA COLLIERY, MOLD,

Beg leave to call the attention of Gas Companies to the superior quality of their Cannel for gas-making purposes.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

Ports of shipment—Birkenhead or Connah's Quay.

Waggons supplied for delivery by railway to any part of England or Wales.

For particulars, prices, and rates of freight, apply to GRIFFITHS BROTHERS, Coppa Colliery, Mold, FLINTSHIRE.

OLD WEMYSS CANNEL COAL.—Yield of gas per ton, 12,896 cubic feet; illuminating power, 31·75 standard candles. Port of shipment, Wemyss.

Analysis and price on application to Mr. WM. CAREY, Manager, Wemyss Colliery, Kirkcaldy, FIFE.

CANNEL COAL.—The West York- shire Iron and Coal Company, Limited, beg to draw the attention of Gas Companies to their Cannel, of which the following is the analysis made by W. Huggon, Esq., F.C.S.:—

Yield of gas per ton	10,296 cubic feet.
Illuminating power rather over	21 sperm candles.
Yield of coke per ton . . .	12 cwt.

The actual working, as reported by one of the largest gas companies in Yorkshire, gives results still more favourable, viz—

Yield of gas.	10,416 cubic feet.
Illuminating power . . .	21·89 sperm candles.
Coke	The same.

We add from the same source the capabilities of the common gas coal—

Yield of gas.	10,080 cubic feet.
Illuminating power . . .	14·41 sperm candles.
Yield of Coke	13 cwt.

COLLIERIES—WEST ARDSLEY, near LEEDS.

For further particulars, address to the Office of the Company, 13, York Place, LEEDS.

CAST-IRON Retorts, Socket Pipes, with Syphons and all requisite Connexions, Lamp Columns, Wrought Iron Tubing, Valves, Street Lamps, Sight Holes, Furnace Doors, Ash Pans, Charging and Coke Shovels, Iron Pails and Coke Barrows, Cross Bars, Fire Pots, Pumps, Iron Borings.

PURIFIERS, CONDENSERS, and SCRUBBERS erected complete, or the materials supplied; with every description of goods in use by Gas-Works, in stock, on wholesale prices, at

Mr. LYNCH WHITE'S,
Old Barge Iron Wharf, Upper Ground Street,
LONDON.

LAMP-POSTS—Plain & Ornamental.
DWARF GAS-PILLARS—Do., do.
LAMP-BRACKETS—Do., do.
LAMPS, in Copper, Tin, and Iron—Do., do.
NUMBERS for STREET-LAMPS.
FOUNTAINS—Garden and Drinking.
VASES—for Gardens, Terraces, &c.

A Book of the newest DESIGNS for these will be forwarded free on receipt of 3s. 6d. in stamps, which will be allowed on first order.

TURNER AND ALLEN,
Founders & Contractors,
201, UPPER THAMES STREET, LONDON.

HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,
SUPPLY GAS AND WATER PIPES OF EVERY SIZE,
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
Castings for Gas-Works of every description.
EXHAUSTERS.
LONDON OFFICE: 95, CANNON STREET.

HARRIS AND PEARSON,
STOURBRIDGE.
PROPRIETORS OF
BEST GLASS-HOUSE POT & CRUCIBLE CLAY.
MANUFACTURERS OF
FIRE-BRICKS, GAS-RETORTS, AND FIRE-CLAY GOODS
OF EVERY DESCRIPTION.
Orders of any magnitude, for home and exportation, executed with all possible despatch.
N.B.—A quantity of Retorts in stock.
Circulars, 15 in. and 16 in. Ovals, 20 in. by 14 in.
D's, 15×13, 16×12, 18×14, 20×16, 21×14, 24×14.

Mr. H. GORE,
CONSULTING GAS ENGINEER,
20, ALFRED PLACE, BEDFORD SQUARE, LONDON, W.C.

LAMBERTS
PATENT GALVANIZED IRON COCKS,
WITH WHITE METAL PLUGS.
TRADE (L) MARK.

Warranted not to corrode or set fast, and are 50 per cent. cheaper than Brass Cocks.

THOMAS LAMBERT AND SONS,
Manufacturers,
SHORT STREET, LAMBETH, LONDON.

GANISTER.—This valuable material which is found to be the best adapted for the lining of furnaces and cupolas in refineries, glass and chemical works, and GANISTER CEMENT for gas-works, specially prepared for setting and patching retorts, can be supplied in any quantity by WARNER, WALDUCK, and Co., No. 11, Old Jewry Chambers, LONDON, E.C.

OXIDE OF IRON,
We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
FRANCIS RITCHIE & SONS,
BELFAST.

B. CARPENTER'S
IMPROVED
WOOD SIEVES FOR GAS PURIFIERS.
WORKS:
14, JOHN STREET, PENTONVILLE ROAD,
LONDON, N.

The above Sieves are used by the principal Gas Companies in London and the country. Their utility, durability, and cheapness combined, render them superior to all others.
Testimonials from Gas Engineers who have tested their qualities forwarded on application.
All orders punctually attended to, and estimates given if required.

WOLVERHAMPTON RETORT WORKS.
ESTABLISHED 1840.
JOHN EUNSON AND SON,
GAS ENGINEERS, AND MANUFACTURERS OF CLAY RETORTS,
AND FIRE GOODS IN GENERAL,
WOLVERHAMPTON.
Retort Mouthpieces, Bolts, Nuts, and every description of Wrought-Iron Work.

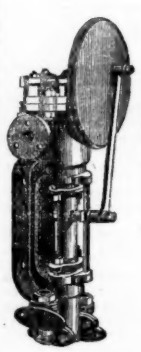
A GREAT SAVING OF TIME, LABOUR, & EXPENSE
IS EFFECTED BY THE USE OF
PRICE'S
PATENT COAL AND COKE BARROWS.

In addition to other testimonials the following has recently been received from one of the largest Gas Companies in London :—

London Gaslight Company, Nine Elms, May 18, 1868.
Dear Sir,—The Patent Coke Barrows are a great improvement, and a saving both in time and labour.
Yours truly, D. WATSON.

They are in use in the Government, Metropolitan, and several country Gas-Works.
Manufacturers for London and South of England—PRIEST & WOOLNOUGH, KINGSTON-ON-THAMES.
Manufacturers for the Midland Counties and North of England—
THE COALBROOKDALE COMPANY, NEAR WELLINGTON, SALOP.
Manufacturers for Ireland—J. EDMUNDSON AND CO., CAPEL STREET, DUBLIN.
Communications to be addressed to the Sole Agent, R. E. KEEN, 50, Claremont Road, Surbiton, S.W.; or either of the above.

NEW PATENT DONKEY STEAM-PUMP.
A. WILSON & CO.,
VAUXHALL IRON-WORKS,
NINE ELMS, LONDON, S.W.



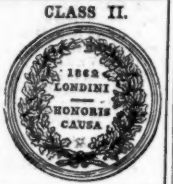
Special attention is called to their New Improved Donkey Pumps, which are the best boiler feeders yet brought before the users of steam power. For boilers supplying steam to apparatus other than a steam-engine they are indispensable, and are rapidly supplanting the use of the feed-pump in the engine. They are also largely used in gas-works for pumping ammoniacal liquor, &c., in all parts of the world.

Size.	Ram.	Stroke.	Approx. H.P. Boiler supplied.	Approx. Galls. thrown per Hour.	Price.
No. 4	1¼ Inch.	3 Inch.	15	230	£10 10 0
5	1½	3	22	350	12 12 0
6	1¾	4	30	500	14 14 0
7	2	4	40	700	17 0 0
8	2¼	5½	55	900	19 10 0
9	2½	5½	75	1150	22 10 0
10	2¾	6½	90	1420	25 10 0
11	2½	6½	110	1720	28 10 0
12	2¼	8	120	2000	31 10 0

1862.

PATENT ANTIMONY PAINT.
MADE ONLY BY
GEORGE HALLETT & CO.,
296, ROTHERHITHE, LONDON, S.E.

CLASS II.



This Paint having been in general use over six years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.
It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (28s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.
Reference is kindly permitted by the Engineers of the City of London, Commercial, London, and Surrey Consumers Gas Companies, who pronounce it the best Paint known for their purposes.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs under 20s. per cwt., as compared with White Lead at 28s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

THE LIQUID METER COMPANY,
LIMITED.

A. A. CROLL, Chairman. GEORGE RAIT, Managing Director.

238, KINGSLAND ROAD, LONDON, N.E.

GEORGE ANDERSON,
GAS AND CONSULTING ENGINEER,

19, NORTHUMBERLAND STREET, STRAND, W.C.

MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.
STEAM-ENGINES and EXHAUSTERS, separately or combined.
FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
STATION GOVERNORS—the Gasholder cannot tilt and cause accident.
BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, contains illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

TO MANAGERS OF GAS-WORKS.

MANN'S IMPROVED SCRUBBER.

See Description and Sketch in "JOURNAL OF GAS LIGHTING," March 31, 1868.

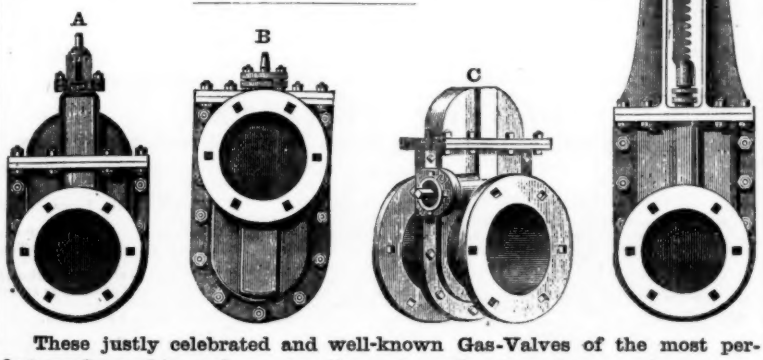
MESSRS. WESTWOOD & WRIGHTS are prepared to submit estimates for the supply and erection complete of the above, either in London or the Provinces.

MESSRS. W. & W. have already constructed several, which are now in successful operation, and give great satisfaction.

In cases where Scrubbers are already constructed, estimates will be submitted for altering and adapting to this principle.

Messrs. WESTWOOD and WRIGHTS,
No. 4, WHARF, CANAL ROAD, KINGSLAND ROAD, LONDON, N.
HOPE BOILER & GASOMETER WORKS,
BRIERLEY HILL, STAFFORDSHIRE, NEAR DUDLEY.

C. & W. WALKERS'
WEDGE GAS-VALVES.



These justly celebrated and well-known Gas-Valves of the most perfect workmanship and construction are made at as low a price as any other kind.

A—Above-ground Screw Gas-Valve, with improved indicator to show when open and shut, is the best kind of Valve for heavy pressures, such as the oxide of iron purification.
B—Under-ground Screw Gas-Valve.
C—Internal Rack Gas-Valve, with wrought-iron pinions.
D—Ordinary Rack and Pinion Valve, with strong undamageable racks and pinions.

MIDLAND IRON-WORKS,
DONNINGTON, NEWPORT, SHROPSHIRE.

PURIFICATION OF GAS.

FRODINGHAM IRONSTONE MINES,
NEAR
BRIGG, LINCOLNSHIRE.

Gas Companies can be supplied from these Mines with OXIDE of IRON, for the purification of Gas, on reasonable terms, and in any quantity that may be required.

This material is a natural Oxide, and is supplied to Gas Companies as taken from the Mines, without any admixture of deleterious matter. It acts freely, and will purify a much larger quantity of gas per ton, than the generality of the material now in use under this name.

It will be found highly beneficial in large establishments, where they are liable to be called upon occasionally to make a much greater quantity of gas than usual, as well as in small establishments where they are limited in space, as by its adoption a much larger quantity of gas can in much less time be purified with the same quantity of material.

Apply to Mr. JAMES SHERWOOD, at the Mines; or to Mr. LIVESEY, 6, Victoria Street, WESTMINSTER, London Agent.

NO NECESSITY
FOR
CANNEL COAL
If POPE and PEARSON'S GAS COAL is used.

WEST RIDING AND SILKSTONE COLLIERIES,
NEAR LEEDS.

NINETEEN YEARS PRACTICAL EXPERIENCE.

EDWIN BENTLEY,
RETORT SETTER,
29, LOWER HOPE STREET, HALIFAX,
YORKSHIRE.

Fire-Clay and Iron Retorts, Double and Single Grooved Brick Retorts, of every description.

Bentley's Improved D Brick Segment Retorts, 5 or 3 in one bed.

Testimonials and references on application.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Office in London, Mr. E. M. PERKINS, 78, Lombard Street.

TO GAS AND WATER COMPANIES.

SECOND-HAND
FIRE AND BURGLAR PROOF
SAFES.

BEFORE PURCHASING SEND FOR
GRIFFITHS' MONTHLY LIST OF SAFES,
By Milner, Marr, Thos. Perry and Sons, Mordan, Price, Whitfield, and every eminent maker, at about half the price of new.

A guarantee given with each.

A large quantity of TANN'S SAFES from £2 10s.

Apply to GRIFFITHS, 43, CANNON STREET, E.C.

FRASER'S PATENT RIBBED
RETORTS.

These Retorts are now used at more than 60 Gas-Works, and continue to give satisfaction.

The Iron Retort is recommended for great durability. The Clay Ovens and Retorts obtain a more speedy and perfect carbonization of the Coal.

To ensure the excellence of the Brick Ovens and Fire-Clay Retorts, the Patentee has made arrangements with the following makers for their supply:—

Messrs. J. CLIFF & SON, Wortley, near Leeds.
E. BAKER & Co., Stourbridge.
W. COCHRANE CARR, Newcastle-on-Tyne.
W. FRASER, Inverkeithing, N.B.

Full particulars, with illustrated circular, testimonials, and prices, will be forwarded on application to A. C. FRASER, Gas-Works, COLCHESTER.

STOURBRIDGE FIRE-CLAY WORKS.

E. BAKER & CO.,
24 WHARF, HARROW ROAD, PADDINGTON, W.

FIRE-BRICKS, LUMPS, SQUARES, and TILES of all dimensions.

GAS-RETORTS always in stock.

GARDEN EDGINGS of various patterns.

ORNAMENTAL BUILDING BRICKS.

GRATE BACKS in various designs.

Contracts entered into to set Retorts, erect Furnaces, &c.

Shipments on the shortest notice.

Makers of A. C. FRASER'S Patent Ribbed Retorts and Brick Ovens.

Now ready, price 21s., bound in cloth, lettered,
THE SIXTEENTH VOLUME
OF THE
JOURNAL OF GAS LIGHTING,
WATER SUPPLY, AND SANITAR IMPROVEMENT.
A Few Copies of Vols. II. to XV. are still on Sale.

London: WILLIAM B. KING, 11, Bolt Court, FLEET STREET, E.C.

Just Published, price 6d. each, by post 7d.; 4s. per doz., per post 4s. 6d.; or 25s. per 100,
PUBLIC LAMP ARBITRATION AT GRAVESEND.
A REPORT OF THE PROCEEDINGS
In the above important case.
London: WILLIAM B. KING, 11, Bolt Court, FLEET STREET, E.C.

METROPOLIS GAS SUPPLY.
Just published, price 4s., by post 4s. 6d., 324 pages, cloth, lettered,
A FULL & COMPLETE REPORT
of the Proceedings (including the Speeches, Discussions, and Evidence) before a Select Committee of the House of Commons—Session 1867—on the
METROPOLIS GAS ACT AMENDMENT BILL,
With the Discussion upon the Second Reading of the Bill and the Report presented by the Committee to the House.
Also the Proceedings before the same Committee upon the Bills of the
IMPERIAL & CHARTERED COMPANIES.

A Few Copies of the
PROCEEDINGS ON THE ARBITRATION
between the
GREAT CENTRAL GAS COMPANY
and
A. A. CROLL, ESQ.,
Are still for sale.
Price 5s., by post 5s. 6d., cloth, lettered.

London: WILLIAM B. KING, 11, Bolt Court, FLEET STREET, E.C.

METROPOLIS WATER SUPPLY.
Just published, price 3s. 6d., by post 4s., cloth, lettered,
REPORT OF PROCEEDINGS
Before the Select Committee of the House of Commons—Session 1867—appointed on the
EAST LONDON WATER BILLS,
Who were instructed to inquire into the operation and results of the
METROPOLIS WATER ACT, 1852,
With an Analysis of the Report presented by the Committee to the House.

London: WILLIAM B. KING, 11, Bolt Court, FLEET STREET, E.C.

Price 6d., by post 7d.,
ON THE PROPOSED
SUPPLY OF WATER TO THE METROPOLIS.
A Lecture Delivered at the Royal Institution of Great Britain,
By DR. FRANKLAND, F.R.S.

Price 1s. 6d., by post 1s. 7d.,
DEFECTS IN THE APPARATUS GENERALLY USED FOR THE DETERMINATION OF
BISULPHIDE OF CARBON
IN
COAL GAS,
And Description of a New Apparatus for its Estimation.
By ALFRED G. ANDERSON, Esq.,
Professor of Chemistry and Practical Chemistry in Queen's College, Birmingham.

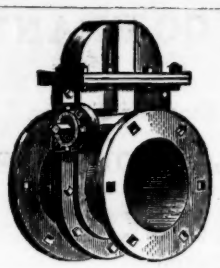
Price 1s. each, by post 1s. 1d.,
PROCEEDINGS IN PARLIAMENT ON THE
CAMBRIDGE GAS BILL,
AND
GREAT GRIMSBY & RICHMOND GAS BILLS.

Price 2s., by post 2s. 1d.,
SOUTHPORT, SHEFFIELD, PAIGNTON, LEEDS, & REDHILL WATER BILLS.

Price 8d. each, or 6s. per doz.,
Proceedings at Audit of Accounts of
SLOUGH LOCAL BOARD OF HEALTH.

LONDON: WILLIAM B. KING, 11, Bolt Court, Fleet Street, E.C.

ELEVENTH THOUSAND.
AGRICULTURAL VALUE
OF
REFUSE GAS LIME.
BY PROFESSOR VOELCKER,
Professor of Chemistry to the Royal Agricultural Society of England.
Price 10s. per 100, or by post, 10s. 6d.
London: WILLIAM B. KING, 11, Bolt Court, FLEET STREET, E.C.



REDUCED PRICES OF
B. DONKIN & CO.'S
IMPROVED GAS VALVES
WITH WROUGHT-IRON PINIONS
from 2 inches to 18 inches, price 9s. 6d. to 12s. per inch diameter
List of prices, with full dimensions of all sizes up to 36 inches, to be had on application.
These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.
Valves made with Outside Racks to order. Also, Screw Water-Valves with Gun-Metal Faces.
B. DONKIN & CO.,
ENGINEERS,
NEAR GRANGE ROAD, BERMONDSEY.

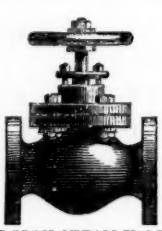
F. & C. OSLER,
45, OXFORD STREET, LONDON;
Manufactory—Broad Street, Birmingham—Established 1807,
MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.
ELEGANT CRYSTAL GLASS CHANDELIERS, for GAS, from £4 upwards
(Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. The more extensive use of GAS in private dwellings has induced Messrs. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.
THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE ON THE LOWEST TERMS.

WALTER FORD,
159, GRAY'S INN ROAD, LONDON.
MANUFACTURER OF WET AND DRY GAS-METERS, STATION-METERS, GOVERNORS, &c. &c.
Sole Manufacturer of **PADDON'S PATENT STREET-LAMP REGULATORS,** for insuring any required consumption. These Regulators are in general and increasing use, and references can be given to Gas Companies who use them for every Lamp.

MATHER AND PLATT,
SALFORD IRON-WORKS, MANCHESTER,
Beg to call attention to their Revised List of Prices of VALVES, TAPS, &c. They also request the notice of Water Companies and Hydraulic Engineers to their IMPROVED SLUICE-VALVES for Water. The Slides have Gun-Metal Facings, are of wedge form, and when screwed down are tight on both sides.

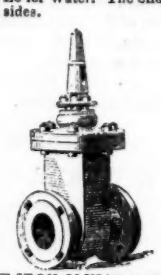
GUN-METAL TAPS.

Bore.	Price.
¾ inch	£0 4 0
1 ,,	0 4 6
1¼ ,,	0 6 0
1½ ,,	0 8 6
2 ,,	0 8 6
2½ ,,	0 11 0
3 ,,	0 14 0
3½ ,,	0 18 0
4 ,,	1 2 6



CAST-IRON STEAM-VALVES.
With Gun-Metal Valves & Seatings.

Bore.	Price.
2 inches	£1 2 6
3 ,,	1 17 6
4 ,,	2 15 0
5 ,,	3 15 0
6 ,,	4 17 0
7 ,,	6 0 0
8 ,,	7 5 0
9 ,,	8 15 0
10 ,,	10 10 0
11 ,,	12 5 0
12 ,,	14 0 0



CAST-IRON SLUICE-VALVES.
With Gun-Metal Facings.

Bore.	Price.
2 inches	£1 10 0
3 ,,	2 5 0
4 ,,	3 0 0
5 ,,	3 16 0
6 ,,	4 14 0
7 ,,	5 14 0
8 ,,	6 16 0
9 ,,	8 0 0
10 ,,	9 6 0
11 ,,	10 14 0
12 ,,	12 4 0

Prices and particulars of all other forms and sizes can be had on application.

ROBERT DEMPSTER,
Gas Engineer and Contractor, Rose Mount Foundry, Elland, near Halifax.
R. D. recommends his Fire-Brick Retorts to Engineers and Managers of Gas Companies; they last from 10 to 12 years.

Iron and Fire-Clay Retorts.
Annular and Pipe Condensers.
Scrubbers and Purifiers, all sizes.
Steam-Engines and Exhausters.
Hydraulic Centre-Valves.
Station-Meters and Governors.
Photometers & Pressure-Gauges.
Lamp-posts and Brackets.
Cast-Iron Mains and Syphons.
Wrought-Iron Tubes, Water Tanks.
Wrought-Iron & Cast-Iron Roofs.
Gasholders, Single-Lift or Telescopic.
Gas Castings of every description.
Retort Setters and Fitters sent to all parts of the country.
Wood Sieves for Purifiers.

Plans and Specifications prepared.

JOSEPH RATCLIFF & SONS,
BRASS & IRON FOUNDERS,
Manufacturers of
BRASS GAS-FITTINGS, CHANDELIERS, &c.,
In various styles; also of
PATENT WELDED WROUGHT-IRON TUBES AND FITTINGS.
Catalogues and prices on application at the
WORKS AND SHOW-ROOMS,
NEW CHURCH STREET, SUMMER LANE, BIRMINGHAM.

ROBERT MACLAREN and CO.,
EGLINTON FOUNDRY, GLASGOW,
Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

TO GAS ENGINEERS AND FITTERS.
Every Description of
GAS LANTERNS & REFLECTOR LAMPS
For Shop Windows kept in Stock.
W. DAVIS, 17, Wells Street, Oxford Street, LONDON, W.
Established 1820.

PARIS EXHIBITION,

1867.

HONOURABLE MENTION.

NEWTON AND BRADDOCK,

GLOBE METER-WORKS, OLDHAM,

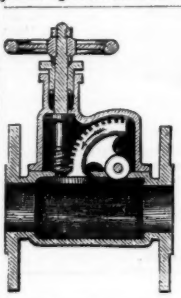
Manufacturers of

STATION METERS for GAS-WORKS, CONSUMERS METERS, GOVERNORS,

GAUGES, PRESSURE AND EXHAUSTER REGISTERS,

EXHAUSTER REGULATORS, &c.

N.B.—The flanges of the plates for the Square Station-Meters are planed so as to ensure perfect joints—guaranteed not to leak.



WARNER'S

NEW PATENT

QUADRANT-MOTION SLUICE or GAS VALVE.

It will be seen, by reference to the drawing, that by this simple method a clear water-way is obtained, the disc being drawn by the screw or worm entirely out of the way; thus all the advantages of the ordinary sluice-valve are obtained at much less cost, and the liability to set fast and get out of order entirely obviated. They are adapted for all purposes for hot or cold water, and equally suited for high or low pressure; and in case of need of repair, a new valve-seat can be applied without removing the body or case of the valve.

Particulars of the Quadrant Valve, also of Hydraulic Machinery, High or Low pressure Cocks, Water Closets, Gas-fitting in all its branches, and general Plumbers' Brass work, can be obtained upon application to

JOHN WARNER & SONS, CRIPPLEGATE, LONDON,

(*Brass and Bell Founders to Her Majesty,*)

HYDRAULIC ENGINEERS.

SCHOLL'S

PATENT PLATINUM

GASLIGHT PERFECTER.

Extract from Report by Dr. Letheby:—

"The results have been very remarkable, for they show an average increase of 63 per cent. on the illuminating power of the gas. I am of opinion, therefore, that the invention is of great practical value."

Price 1s. each for Fish-tail Burners.

To be had retail of Gas-Fitters and Ironmongers, and wholesale of

JOHN SCHOLL, 41 & 42, BERWICK STREET, OXFORD STREET

LONDON, W.

Terms on application. N.B.—A specimen sent free on receipt of Twelve stamps.

*** Further testimonials from Drs. Frankland and Crooks, showing the great practical value of this invention, will be shortly published.

JAMES MILNE & SON,

GAS ENGINEERS,

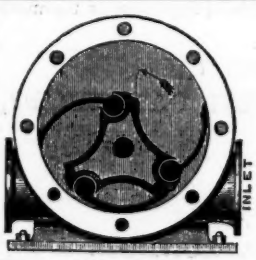
Gas-Meter, Gas Apparatus, and Gasfittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Station-Meters, Governors, Consumers Meters, Gas Lustres, Chandeliers, Brackets, &c., and every description of Gasfittings and Gas Apparatus.



CHARLES HORSLEY'S

PATENT

GAS EXHAUSTER.

(From 250 Feet to 200,000 Feet per Hour.)

Also,

ROTARY TAR, OIL, AND LIQUOR PUMPS.

For particulars and prices apply to the Patentee,

22, Wharf Road, City Road, London, N.

SAMUEL CUTLER & SON,

CONTRACTING GAS ENGINEERS, &c.

MANUFACTURERS OF GASHOLDERS, TANKS, PURIFIERS,

AND ALL DESCRIPTIONS OF GAS-MAKING APPARATUS.

Iron Roofs, and General Iron Work. Mains Supplied and Laid.

S. C. & Son supply every requirement for a Gas-Work, and keep in stock Retort Lids, Cotters, Barrows, Scoops, Bolts and Nuts, &c. &c.

PROVIDENCE IRON-WORKS, MILLWALL, LONDON, E.

Now ready, roan tuck, gilt edges, price 6s. (postage 4d.),

WEALE'S ENGINEER'S, ARCHITECT'S,

AND

CONTRACTOR'S POCKET-BOOK for 1868.

Considerably improved, with many additions, and Eight Copper Plates.

Besides the usual vast mass of Rules, Formulæ, Tables, &c., will be found

A DIARY OF EVENTS AND DATA; A GENERAL CALENDAR;

A GAS ENGINEER'S CALENDAR;

GAS-WORKS, COAL DISTILLATION, CONSTITUENTS AND QUALITIES OF GAS, TESTS, GASHOLDERS, RETORTS, &c.;

LIST OF MEMBERS OF

THE INSTITUTES OF CIVIL ENGINEERS AND OF BRITISH ARCHITECTS;

Tables for the Reciprocal Conversion of British and Metric Weights and Measures, &c.

"There is no work published by or without authority, for the use of the scientific branches of the services, which contains anything like the amount of admirably arranged, reliable, and useful information. It is really a most solid, substantial, and excellent work; and not a page can be opened by a man of ordinary intelligence which will not satisfy him that this praise is amply deserved."—*Army and Navy Gazette.*

"Contains some valuable information to managers of gas-works, more especially a 'Gas Engineer's Calendar,' with tables for calculating the periods of lighting and extinguishing public lamps."—*Journal of Gas Lighting.*

LOCKWOOD & Co., 7, STATIONERS' HALL COURT, E.C.

RUTTER ON GAS LIGHTING.

Just Published, Fcap. 8vo., pp. 71, sewed, price 6d.,

ADVANTAGES of GAS in PRIVATE HOUSES.

A HANDY BOOK FOR GAS CONSUMERS: TELLING THEM WHAT TO DO, AND WHAT NOT TO DO.

BY J. O. N. RUTTER, F.R.A.S.

A new and revised edition, and the 190th thousand.

LONDON:

VIRTUE BROTHERS AND CO., 26, IVY LANE, PATERNOSTER ROW, and all Booksellers. 1866.

For distribution by gas companies, the price is £12 12s. per 1000 copies, and £1 10s. per 100.

Crown 16mo, pp. 20,

GAS IN DWELLING-HOUSES:

ITS USES, CONVENIENCES, AND ECONOMY.

A revised and enlarged edition, and the 57th thousand,

Price—1000 copies, £3 10s.; 500 copies, £1 17s. 6d., any smaller number at 8s. 6d. per 100.

When 1000 copies are ordered, the official title, scale of prices, and other information relating to the business of the Company, will be printed on the covers without extra charge.

All orders and inquiries for the last-mentioned edition to be addressed to the AUTHOR, Black Rock, BRIGHTON.

THE

PROPOSED WATER SUPPLY

FOR

THE METROPOLIS.

Just published, price 6d., by post 7d.,

A LECTURE

DELIVERED AT THE

ROYAL INSTITUTION OF GREAT BRITAIN,

On Friday, April 3, 1868,

BY DR. FRANKLAND, F.R.S.,

ON THE

Proposed Water Supply for the Metropolis.

Just Published, price 1s., by post 1s. 1d.,

EXPERIMENTS ON THE

FLOW OF GAS IN LONG PIPES,

MADE IN THE WORKS OF THE

PARIS GAS COMPANY,

By M. ARSON, Engineer-in-Chief of the Company, Assisted by MM. MONARD AND HONORÉ.

Translated from the Memoirs of the Society of Civil Engineers of Paris,

By Dr. POLE, F.R.S., Mem. Inst. C.E.

London: WILLIAM B. KING, 11, Bolt Court, FLEET STREET, E.C.

OBSTRUCTION OF THE HIGHWAY BY LAYING GAS-MAINS.

Just published, price 2s., by post 2s. 1d.,

A REPORT

Of the Arguments in and the Judgment of the Court of Chancery in the case of the

CAMBRIDGE UNIVERSITY AND TOWN GASLIGHT COMPANY

v.

CAMBRIDGE CONSUMERS GAS COMPANY LIMITED, AND OTHERS.

London: WILLIAM B. KING, 11, Bolt Court, FLEET STREET, E.C.

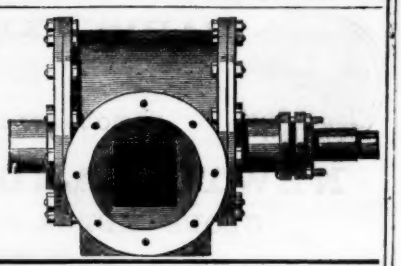
ROTATORY AND DOUBLE-ACTING GAS-EXHAUSTERS,

with many recent improvements, from 1500 to 150,000 cubic feet per Hour.

JAMES BURTON, SONS, & WALLER,

MAKERS OF ENGINES, MACHINERY, and IRONWORK for GAS-WORKS,
efficient and durable TAR, LIQUOR, and SYPHON PUMPS,
GAS-VALVES, with or without Wedges, worked with powerful Worm and Rack,
SELF-ACTING BY-PASS VALVES, with Lid and Relieving Lever,
ROTATORY, TUMBLER, and CAPILLARY WATER DISTRIBUTORS for SCRUBBERS.
SMALL-SIZE EXHAUSTERS KEPT IN STOCK.

JOHN'S PLACE, HOLLAND STREET, SOUTHWARK, LONDON, S.E.



KING BROTHERS,

STOURBRIDGE FIRE-BRICK AND RETORT WORKS.

KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them FREE FROM CRACKS AND CORRECT IN FORM. By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

Retort Ovens, Fire-Bricks, Guards, Saddles, Rabbitted Burs, Flues, and Quarries, are all Manufactured of the same quality of Clay.
Every Retort and Brick is branded "King Brothers, Stourbridge."

Agent in Ireland—Mr. JAMES FURNISS, No. 3, FOWNES STREET, DUBLIN.

WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of
RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY
beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.
The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.
GAS OVENS IN SEGMENTS OF EQUAL QUALITY.
A large stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all sizes kept in London at CHRISTIE & CO.'s Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.
N.B.—*Export orders continue to have prompt attention.*

THE GAS-METER COMPANY

(LIMITED), LONDON,

(Successors to CROLL, RAIT, and CO., LONDON, and WEST and GREGSON, OLDHAM.)

MANUFACTURE

STATION-METERS & GOVERNORS

At their Oldham Establishment, which has long possessed the reputation of supplying this description of apparatus of the most perfect construction and appropriate design.

CONSUMERS GAS-METERS IN CAST-IRON & TINNED SHEET-IRON CASES.
STREET GOVERNORS, PRESSURE and EXHAUST REGISTERS, TEST GASHOLDERS,
AND EXPERIMENTAL GAS APPARATUS GENERALLY.

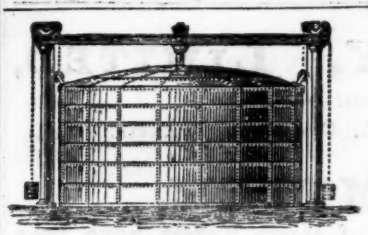
For information, &c., apply to
W. ARCHER, Manager, Meter Factory, OLDHAM;
OR TO
GEORGE RAIT, Managing Director, KINGSLAND ROAD, LONDON.

E. J. & J. PEARSON,

DELPH & TINTAM ABBEY FIRE-CLAY & BRICK-WORKS,

STOURBRIDGE,

PROPRIETORS OF
BEST GLASS-HOUSE POT & CRUCIBLE CLAY;
MANUFACTURERS OF
GLASS-HOUSE POTS, CRUCIBLES, GAS-RETORTS, & FIRE-BRICKS OF EVERY DESCRIPTION.



IMPROVED GAS APPARATUS,

FOR TOWNS, VILLAGES, &c.,

INVENTED AND MANUFACTURED BY

W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD.

WILL BE SENT ON APPLICATION:—

PLANS, SPECIFICATIONS, and PRICES of GAS APPARATUS;

PLANS, SPECIFICATIONS, and ESTIMATES of the requisite BUILDINGS for each size of Apparatus;

PLANS of the IMPROVED ANNULAR CONDENSERS;

PLANS of the COMBINED PURIFYING APPARATUS, so eminently adapted for Exportation.

LONDON OFFICES—56, GRACECHURCH STREET, CITY.

*** *Please address letters to the London Offices.*

SILVER MEDAL, INTERNATIONAL EXHIBITION, PARIS, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS,

PLAIN, GALVANIZED, & ENAMELLED, for Gas, Steam, and Water, from ⅛ in. to 6 in. bore.

STOCKS, TAPS, and DIES, GUN METAL GLAND-COCKS, WATER-GAUGES, &c.

PATENT LAP-WELDED IRON TUBES

For Locomotive and Marine Boilers, &c.

LONDON WAREHOUSE—Nº 66, QUEEN STREET, E.C.

LIVERPOOL: No. 4, Cooper's Row, and Bold's Yard, Strand Street.

MANCHESTER: Barlow's Croft, Chapel Street, Salford.

THE ONLY COMPLETE CAST-IRON CASED DRY GAS-METER,

PATENTED MARCH 31, 1865.

Gas Engineers and others will find that the above Meter is made of the most durable material, also that it can be repaired at a fraction of the cost of any other Meter now manufactured; all the interior fittings, as well as the case, being fitted together with screws.

Drawings explanatory of the above on application.

SOLE MANUFACTURERS:

FULLERTON, SON, & CO., ABBEY MOUNT WORKS, EDINBURGH.

Station-Meters and Gas Apparatus, Consumers Wet Gas-Meters in Cast-Iron, and Dry in Tin Plate Cases.

ORLANDO BROTHERS' SELF-ACTING DISTRICT GOVERNOR.

Prices, according to size, can be obtained upon application to

Mr. WILLIAM ARCHER,

METER COMPANY'S WORKS, OLDHAM.

PARIS, 1867.

CLASSES 24 and 53.

WILLIAM SUGG,

GAS ENGINEER.

LONDON, 1862.

CLASSES 13 and 31.

PUBLIC LAMP GOVERNORS, LEVER COCKS, AND POLE LIGHTERS,

LAMP METERS AND BOXES.

The Catalogue and Lists of Prices for all the New Instruments and Apparatus of his Manufacture are now ready, and may be had on application, per post or otherwise, at

VINCENT WORKS, VINCENT STREET, WESTMINSTER, S.W.

THE

GAS-METER COMPANY, LIMITED,

A. ANGUS CROLL, C.E., Chairman.

GEORGE RAIT, MANAGING DIRECTOR. T. G. BARLOW, C.E., CONSULTING ENGINEER.

CROLL'S DRY GAS-METER,

(Invented and Patented in 1844, since which time 200,000 of these Meters have been manufactured by Mr. CROLL,)

Obtained **PRIZE MEDALS** at the EXHIBITIONS of London, 1851, of New York, 1853, and Paris, 1855.

IMPROVED in 1858,

And was awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for

"GOOD CONSTRUCTION and SOUND WORKMANSHIP."

Now manufactured by the GAS-METER COMPANY, LIMITED, KINGSLAND ROAD, LONDON; and, for the purpose of obtaining greater accuracy in all its parts, the most perfect machinery has been adopted, "By which the construction of the Meter is much simplified, while its liability to get out of order is diminished." (See report of T. G. BARLOW, Esq., C.E.)

ALEXANDER WRIGHT & CO.,

MANUFACTURERS OF

WET METERS,

COMPENSATING WET METERS,

AND

IMPROVED DRY METERS

of the very highest excellence.

STATION-METERS AND GOVERNORS.

STREET-LAMP REGULATORS.

TESTING APPARATUS

of the most perfect description for all purposes relating to Gas.

KEELING'S PATENT STATION-GOVERNOR REGULATOR.

55 and 55a, MILLBANK STREET, WESTMINSTER, S.W., and COPENHAGEN.

R. LAIDLAW & SON,

GAS ENGINEERS, CONTRACTORS, IRON & BRASS FOUNDERS,

Iron-Works and Foundries, GLASGOW, **(190, Strand,) LONDON,** **Meter-Works & Brass Foundry, EDINBURGH,**

MANUFACTURERS OF

GASOMETERS AND GAS APPARATUS OF EVERY DESCRIPTION;

CAST-IRON PIPES, all sizes, cast in DRY SAND and VERTICALLY by PATENT MACHINERY;

IRON ROOFS, COLUMNS, BEAMS, and GIRDERS; BOILERS, TANKS, and CISTERNS;

VALVES, Screw, Rack and Pinion, &c., for Gas and Water, with Iron or Gun-Metal Facings, &c.;

WROUGHT-IRON TUBE and FITTINGS for Gas, Water, or Steam;

GAS-METERS (Wet and Dry) of the most approved Construction, STATION-METERS, GOVERNORS, &c.;

GASELIERS, BRACKETS, PENDANTS, PILLARS, and GAS-FITTINGS of every description;

LAMP-POSTS and LANTERNS for Streets, &c.

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,

invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.

MANUFACTURERS OF

GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;

DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.;

IMPROVED FULL-WAY CARTER'S VALVES (much approved of);

GAS-STOVES, and every article connected with Gas Apparatus.

CAST & WROUGHT-IRON PIPE BLACK & GALVANIZED. COPPER, TIN, BRASS, & COMPOSITION TUBING.

D. HULETT'S IMPROVED SERVICE CLEANSER

for clearing out Mains, Services, and Interior Fittings—65s. net.

Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.

Sole Manufacturers of Church and Mann's Photometer.

Large Pattern Books with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, August 4, 1868.